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Sibling Group Cohesion: A Definition, Validation, and Power in Predicting Perceived Personal Achievement

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Sibling Group Cohesion: A Definition, Validation, and Power in Predicting Perceived Personal Achievement

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Dedication

This dissertation is dedicated to my Mom and Dad who have supported my education for so many years and in so many ways. From attending PTO meetings, walking me to school, moving to give us the best school district, and introducing me to Case Western Reserve University (and persuading me that it wasn't a military school!) They have been my unwavering supporters in all I do, and I know I wouldn't have arrived at this point without them. Thank you, Mom and Dad.

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Sibling Group Cohesion: A Definition, Validation, and Power in Predicting Perceived Personal Achievement

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The goals of this study are to describe the importance of developing a measure of sibling group cohesion, to define this measure, to test the validity of the measure using similar constructs, and to explore how sibling group cohesion predicts perceived personal achievement. Sibling group cohesion is defined as *an individual's voluntary commitment to one's group of siblings, which forms an open unit*. A 12-item scale of adult sibling group cohesion is developed and validated. Adult siblings from sibling groups of 3 or more were asked to take an online survey and 541 participants from 184 families completed the survey. Three theories are proposed for how sibling group cohesion could impact achievement: support, expectations, and shared identity theories. Results indicate that sibling group cohesion is related to, but still unique from, the average and standard deviation of dyadic sibling relationship positivity quality. Individuals from larger families, who have a high proportion of siblings who inspire them, and who have high and consistently positive dyadic relationships report having high sibling group cohesion.

Additionally, results from this study show sibling group cohesion is a strong positive predictor of two measurements of perceived personal achievement. The predictive power of sibling group cohesion is stronger than that of the average of dyadic sibling relationship positivity, and is mediated by a combination of support, average dyadic positivity, and demographic variables. Specifically, receiving active and emotional support, as well as being introduced to activities by a majority of one's siblings is predictive of better achievement.

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Chapter 1: Introduction

"If the individual is part of an organized family system, he or she is never truly independent and can only be understood in context" (Minuchin, 1985, p. 290). Individuals who have more than one sibling experience each sibling relationship in the context of a greater social sibling group. One dyad within the group cannot be understood without the context of the others. Therefore, features of the group dynamic may have an impact on well-being *independent from* the impact of each dyadic relationship.

One of these important group characteristics is cohesion. Cohesion has been defined as "a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives" (Carron, 1982, p.124). Group cohesion has a consistent and robust positive relationship with personal well-being and group performance in a wide variety of groups including sports teams, business groups, and members of the military (A. Lepine, Piccolo, Jackson, Mathieu, & Saul, 2008; Beal, Cohen, Burke, & McLendon, 2003; Carron, Colman, Wheeler, & Stevens, 2002; Chiocchio & Essiembre, 2009; Mesmer-Magnus & DeChurch, 2009; Mullen & Copper, 1994; Oliver, Oliver, Harman, Hoover, Hayes, & Pandhi, 1999; Weber & Donahue, 2001). The direction of the relationship between cohesion and performance is generally acknowledged as bidirectional (Carron, 1982; Landers, Wilkinson, Hatfield, & Barber, 1982).

The association between well-being and high cohesion is also found in families. Family cohesion is the "emotional bonding that family members have toward one another"

(Olson, 1993, p. 105). The literature shows that family cohesion during childhood and adolescence has a positive relationship with academic success, creativity, leadership (Chan, 2005), marital adjustment in adulthood (Fisiloglu & Lorenzetti, 1994), having fun together as a family (Copper, Holman, & Braithwaite,1983), adjustment to college (Rice, Cole, & Lapsley, 1990), adolescent life-satisfaction (Manzi, Vignoles, Regalia, & Scabini, 2006), and adolescent self-esteem (Baldwin & Hoffmann, 2002). A negative relationship exists between family cohesion and depression (Manzi et al., 2006), anxiety, withdrawal (Barber & Buehler, 1996), externalizing problems (Richmond & Stocker, 2006), parent-child conflict (Copper, et al., 1983), adolescent delinquent behavior (Barber & Buehler, 1996) and sibling conflict (Brody, Stoneman, McCoy, & Forehand, 1992). Strong family cohesion can also be a mediator between the negative effects of parental alcoholism on adolescent individual outcomes (Farrell, Barnes, & Banerjee, 1995).

Surprisingly, researchers have not studied the most long-lasting group of all, the sibling group. The goals of this study are to explain why a measure of sibling group cohesion is needed and to define a measure of sibling group cohesion. Next the validity of this measure is tested against similar measures to explore if sibling group cohesion is unique from the aggregate of dyadic relationships. Lastly, the power of sibling group cohesion is tested in predicting perceived personal achievement. Perceived personal achievement was chosen as the outcome variable because it measures aspects of both self-esteem and of true accomplishment. The details of this measure are described in later sections. Three theories are used to assess mediation by various sibling relationship qualities and explore if and how sibling group cohesion is related to perceived personal

achievement. First, the limitations of current sibling research methods and the importance of studying siblings from a group perspective are described.

Chapter 2: Literature Review

THE IMPORTANCE OF SIBLING GROUP COHESION

The lack of research on cohesion in sibling groups is surprising in light of substantial support for the strong effects of dyadic sibling relationships on well-being (e.g., Bank, et al., 2004; Conger & Conger, 2002; Kim, McHale, Crouter, & Osgood, 2007; Milevsky, 2005). Positive sibling relationships are associated with numerous social, emotional, and health benefits throughout childhood and adolescence. Some of these benefits include greater popularity in early childhood (Mendelson, Aboud, & Lanthier, 1997), higher peer competence (Kim, et al., 2007), and better adjustment (Pike, Coldwell, & Dunn, 2005). Positive sibling relationships can also be a protective factor from depression (Kim, et al., 2007), delinquency (Widmer & Weiss, 2000), and other adversity (Conger & Conger, 2002). The positive impact of sibling relationships on social well-being has been documented in adolescents as well as children. Adolescents who felt they had positive relationships with their siblings had better friendships and higher self-esteem one year later, which was then related to reduced depression, loneliness, and externalizing behaviors in the following year (Yeh & Lempers, 2004).

Studies of adults have shown closeness between siblings is associated with fewer power struggles, improved regulation of emotion in stressful situations, and more contact and commitment to one other (e.g., Lee, Mancini & Maxwell, 1990; Shortt & Gottman, 1997). Because dyadic sibling relationships are strong predictors of well-being, and

because cohesion has been shown to have significant, positive effects, sibling group cohesion may also be a powerful and essential determinant of individual outcomes.

As Kramer and Bank (2005) stated, "Research that is limited to the study of only two siblings per family (when more siblings exist) may be a trend of the past" (p. 484). Nevertheless, most sibling researchers continue to collect data only on one or two siblings in the family (i.e., a single sibling relationship), even when other sibling relationships exist. This omission has consequences for understanding the dynamics of sibling relationships.

At the heart of the issue is the evidence that each member of the family is affected by all other relationships within the family (Minuchin, 1985). By only studying one sibling dyad in a family, much of the context for understanding siblings is overlooked. Certainly, the existence of other siblings in the family has an effect on any given dyadic sibling relationship, and it is important to study all members of the family (Hetherington, 1994; Richmond & Stocker, 2006). To ignore a sibling's existence by only studying one relationship in the family is to miss a huge part of the experience of sibling groups. Until recently, these limitations could be attributed to a lack of methodology and computing power to accommodate the nested structure of family data. However, the development of multilevel modeling now allows researchers to unpack family data and explore the complexities of group dynamics in multiple relationships.

CHANGING FROM A DYADIC TO GROUP PERSPECTIVE

In order to understand group cohesion, one must leave behind a dyadic perspective. When more than two people interact, the experience is exponentially more complex than

the experience of two people interacting. This is because *the group has properties distinct from the dyadic relationships involved*. This idea is fundamental to the understanding of group cohesion and explains why two people alone cannot have group cohesion. Because the group must go beyond one dyadic relationship, sibling group cohesion can only be studied in families where there are more than two siblings.

Because group cohesion is unique from the sum of its parts (Bollen & Hoyle, 1990), the dyadic relationships should not simply be summed or averaged to create a measure of group cohesion. In fact, in some cases, the dyadic relationship quality and group cohesion may not even be highly correlated. Consider a sports team comprised of individuals, none of whom are extremely close socially or emotionally, but who work well together, respect one another, and consider the team to be an important defining quality of their identity. Their measurements of relationship quality would be moderate or low, but their group cohesion high.

Group cohesion does not exist between two people, and therefore we cannot use the language, measurements, or frame of reference of dyadic relationships to understand cohesion. Kenny, Mannetti, Pierro, Livi, and Kashy (2002) wrote, "Unfortunately, all too often, the analysis of group data is based on models that were developed for the analysis of data from individuals and not groups. For significant theoretical advances in the study of group processes to occur, it is essential that methods be developed that are specifically designed to model and analyze group data" (p. 126). Studying a *group* requires a set of research questions, theory, and measurements related to *groups*. Researchers studying athletics, business, and military groups have been evaluating group processes in this

broader way for years. Family systems theory has applied group dynamics to families, but not to the sibling group itself. In order to develop this group perspective, a consistent conceptualization of group measures is necessary, as discussed below.

MEASUREMENT OF SIBLING GROUP COHESION

Historically, cohesion has been measured in one of two ways. Some researchers measure cohesion at the group level (e.g., Beal, et al., 2003; Kerig, 1995; Richmond & Stocker, 2006) with only one score for the group, which is consistent for all members. Others believe cohesion can be conceptualized and measured at the individual level by individuals' reports (Bollen & Hoyle, 1990), so that each individual can give a unique rating. In this study, cohesion is considered to be an individual-level construct because this allows for diversity in opinion among group members. Each person's sense of belonging to the group may or may not be positively correlated with others in the group (Bollen & Hoyle, 1990; Feldman, Wentzel, & Gehring, 1989), and it is important to acknowledge and explore these differences.

It is also essential that *all* group members provide their unique perspectives. As family systems theory posits, the family is an organized unit in which all individuals and subsystems within the unit are interdependent, and the individual can only be understood in the larger context of the family (Minuchin, 1985). The complexity of the family cannot be captured by one member's response (Feldman et al., 1989); neither can it be captured without every member's response. Therefore all siblings should individually report sibling group cohesion to provide the truest measure of diversity and agreement.

Most importantly, researchers should let their research questions guide the level of

measurement they choose (individual vs. group). The importance of matching the level of measurement to the level of theory for any given construct has been stressed throughout the literature on group cohesion (e.g., Dion, 2000; Oliver et al., 2000). In addition to choosing a level with which to study cohesion, researchers also are divided about how cohesion relates to enmeshment.

Cohesion Versus Enmeshment

Enmeshment, a term developed from studies of clinical family populations, is defined as a "familial environment in which members are undifferentiated from or overly dependent on each other" (Minuchin, Montalvo, Guerney, Rosman, & Schumer, 1967, as cited in Kinnier, Brigman, & Noble, 1990). Family enmeshment can be characterized by intrusiveness, psychological control, dependency, and a lack of tolerance for individuality (Manzi, et al., 2006). Enmeshment in the family has been associated with aggressive behavior, anxiety, depression, and withdrawal in adolescents (Barber & Buehler, 1996; Manzi, et al., 2006), as well as career indecision in young adulthood (Kinnier, et al., 1990).

Enmeshment is expected to exist in some sibling groups, possibly resulting in a lack of autonomy and over-identification with one's siblings. Although not previously studied, enmeshed siblings may not be permitted to try novel activities, have outside friends, or express alternative opinions to established beliefs. They may experience pressure to conform to expectations, live in the same area, and maintain high levels of dependence throughout adulthood.

Some researchers believe enmeshment represents a high level of cohesion, and that a curvilinear relationship exists between cohesion and optimal family functioning (Olson, 2000). However, many researchers have found it difficult to validate the curvilinear relationship (e.g., Fisiloglu & Lorenzetti, 1994). These researchers have instead found cohesion and enmeshment to be orthogonal constructs, with the highest functioning families experiencing the highest levels of cohesion (e.g., Barber & Buehler, 1996; Fisiloglu & Lorenzetti, 1994; Manzi et al., 2006). In this study, sibling cohesion and sibling enmeshment are considered different constructs, with high cohesion resulting in positive well-being for individuals, and enmeshment resulting in negative outcomes for individuals.

Neither sibling enmeshment nor sibling group cohesion have been previously defined. This is partially because research on sibling relationships rarely includes information from all siblings in the family when more than two exist. In the next section, a definition of adult sibling group cohesion is proposed along with details about why it is unique from family cohesion.

Defining Sibling Group Cohesion

Despite the fact that family cohesion has been studied extensively and that 40 percent of children in 2009 were living with more than one sibling, thus making them part of a sibling group (U.S. Census Bureau, 2009), studies of sibling cohesion in normative sibling groups are virtually nonexistent. Researchers have long recognized that a sibling group is not just several relationships combined but that the group itself has features (Minuchin, 1985). Nevertheless, sibling group cohesion has remained undefined.

To develop a definition of sibling group cohesion, research on sibling relationships, family cohesion, and other forms of group cohesion were studied. To avoid previous pitfalls in cohesion definitions, sibling group cohesion is specified as being a construct measured at the individual level, not the family level. This study defines sibling group cohesion as: *an individual's voluntary commitment to one's group of siblings, which forms an open unit*. Four of the defining features are described below.

First, sibling group cohesion can only exist in sibling groups of three or more people, otherwise the group dynamic cannot be separated from the dyadic relationship. One of the fundamental qualities of group cohesion is that it encompasses a separate feeling from the sum of the dyadic relationships (Bollen & Hoyle, 1990); therefore, cohesion cannot exist when there are only two members of the group. Also, sibling group cohesion results in a unit, indicating there is a resulting group that has unique properties and is not simply an aggregate of dyadic relationships.

Second, sibling group cohesion is voluntary and creates an open group, meaning the members are not exclusive or intolerant of interactions and connections with people outside the sibling unit. The effects of high cohesion on those outside of the group are rarely studied, but negative effects are expected to occur as a result of enmeshed groups, not cohesive ones. This is because closed groups are likely formed by enmeshment and intolerance, not high cohesion. In other words, the maximum level of cohesion is not damaging to outside (or inside) relationships, as siblings remain open to the world around them.

Third, sibling group cohesion is formed through commitment to the group. Group membership can be source of pride and feeling part of group can help build one's self-esteem (Tajfel & Turner, 1979). Therefore, individuals are motivated to be committed to and feel positive about their group membership. It takes an extra and consistent amount of pride and respect in one's siblings to be committed to them as a group, and not just individuals. Thus when siblings choose to commit themselves to their group of siblings, they are building self-esteem and building group cohesion.

Fourth, sibling group cohesion is represented by an *individual's* feelings toward a group, and should be assessed by each unique member (Bollen & Hoyle, 1990). Sibling group cohesion cannot be assessed by an outsider, it is a personal feeling, and may vary within the group itself. Variations within the group may also be important predictors of individual- and family-level outcomes, but can only be investigated if each individual rates group cohesion. The individual-level assessment is essential to the study of sibling group cohesion. Next, a discussion of how sibling group cohesion differs from family cohesion is presented.

No Parents Allowed

Studies of family cohesion include parents and children. These studies are important, but no other disciplines include the leaders of a group in the measurement of cohesion. For example, the coach on a sports team is an extremely important figure, but is not considered a teammate. The reason for this separation is obvious: leadership figures do not participate in the same activities as the team members, and their power relative to the team members automatically excludes them from being perceived as part of the inside

group. This does not mean they do not have an effect on the team members' experience of cohesion; in fact, they are often the most influential people in creating and affecting cohesion in the group. However, their special role as the group leader excludes them from being group members.

An individual cannot be both above and within the group at the same time. Although some members of the group may function as social leaders, such as team captains, they still participate in group activities (playing on the team), and are not faced with major team planning and management decisions (game scheduling, travel itinerary, recruitment). Even adult offspring typically do not consider their parents to be true peers, due to differences in generation, life stages, and the common eventual role of the offspring as caretakers of elder parents. Therefore, it is important to collect information about the sibling group, distinct from, *and* in addition to, the family unit. This way, the differences and similarities between cohesion in the sibling group alone and cohesion in the entire family unit can be explored.

It has previously been discussed that group cohesion is unique from the sum of dyadic relationships (Bollen & Hoyle, 1990). The relationship between sibling group cohesion and dyadic sibling positivity is described below.

GREATER THAN THE SUM OF ITS PARTS

Sibling group cohesion is expected to be unique from the average of positivity in the dyadic relationships because it reflects features of the group, and not just the dyadic relationships, as found in other studies of cohesion (Bollen & Hoyle, 1990). Very little research has been done to explore specifically how dyadic relationship quality is related to

group cohesion, but many other positive variables have been studied. Family cohesion is associated with many positive relationship variables, including greater marital satisfaction (Campbell, & Snow, 1992; Henderson, Sayger, & Horne, 2003; James, & Hunsley, 1995), workplace social support (Pedersen, Minnotte, & Mannon, 2010), social support between group members (Griffith, 1989), and family satisfaction (Lightsey, & Sweeney, 2008). In summary, high group cohesion is related to stronger relationships between group members. Therefore, sibling group cohesion and sibling relationships are expected to be strongly related, but unique variables. As discussed previously, the group has properties that are unique from dyadic relationships, and cohesion has proven to be a unique predictor of positive outcomes, even when controlling for dyadic relationships (Richmond & Stocker, 2006).

Because the study of sibling group cohesion is new and hasn't been validated using other measures, the average and standard deviation of dyadic relationship positivity are explored as predictor variables to assess if sibling group cohesion is unique from these constructs. A higher average dyadic positivity and lower standard deviation in average positivity between siblings is expected to have a positive relationship with sibling group cohesion. Because outliers are likely to damage sibling group cohesion, the smaller the standard deviation in how one individual rates all their siblings, the more likely they are to have high group cohesion.

In addition, measures of support, expectations, and shared identity are also explored as potential predictors. It is important to note the support measure in this study is reflective of the *percent of siblings offering this specific form of support*. The details of the

measurement of support are described in the methodology.

Support, expectations, and shared identity are explored as predictors because they are unique from both dyadic positivity and group cohesion, but may help to define sibling group cohesion. Because group cohesion is related to so many types of positive relationships (e.g. Campbell, & Snow, 1992; Henderson, et al., 2003; James, & Hunsley, 1995, Lightsey, & Sweeney, 2008), sibling group cohesion may be related to support, shared identity, and expectations. These three constructs are studied to help identify the mechanisms that do, and do not, relate to sibling group cohesion.

The next section moves away from predictors of sibling group cohesion and explores the predictive power of sibling group cohesion. Three theories are presented to explore how and why sibling group cohesion might predict perceived personal achievement.

EFFECTS OF SIBLING GROUP COHESION ON PERCEIVED PERSONAL ACHIEVEMENT

The outcome in this study is perceived personal achievement, which taps into both self-esteem (as self-confident people may be more likely to acknowledge their accomplishments) and actual achievement. Historically, the influence of sibling relationships on achievement has largely been ignored (Côté, 1999), and the impact of specific aspects of sibling dynamics on achievements is entirely unknown. Most of the existing research assesses the opposite direction, i.e., how achievements affect sibling relationships (e.g. Côté, 1999; Davis & Meyer, 2008; Monsaas & Engelhard, 1990; Tuttle & Cornell, 1993). One of the few studies that has explored how sibling relationships affect achievement found that rivalries between sibling relationships, coupled with creative

intellectual ability and parents who value intellectual accomplishment, result in more creative and accomplished individuals (Helson, 1968). This is evidence that the connections between sibling relationships and achievement are complex.

When the definition of "achievement" is expanded to include social and emotional well-being, the literature is much more abundant. This research overwhelmingly finds that feelings of positivity and warmth in sibling relationships benefit social and emotional outcomes (Howe, et al., 2001; Kim, et al., 2007; McCoy, et al., 1994; Pike, et al., 2005).

If sibling group cohesion creates effects similar to family cohesion, than cohesive siblings may be more satisfied with life, have higher self-esteem, find more stable relationship partners, be less depressed, be less lonely, and display fewer externalizing and internalizing problems. Both family cohesion and positive sibling relationships have positive effects on individuals; and family relationships are documented contributors to achievement in academics (Stewart, 2008; Feldman & Wentzel, 1990) and athletics (Côté, 1999). Therefore, sibling group cohesion is expected to have an effect on personal achievement. The question is: Why would sibling group cohesion have more positive effects than the additive effects of positive dyadic relationships? Three theories are presented to explain the mechanisms through which cohesion affects perceived achievement.

Support Theory

Supportive sibling relationships in young adulthood have been associated with low depression and loneliness, and high self-esteem and life satisfaction (Milevsky, 2005). Perceived sibling support in early adolescence is also negatively related to externalizing

problems (Branje, van Lieshout, van Aken, & Haselager, 2004). In adolescence, supportive sibling relationships can act as a buffer from the negative effects of parent hostility in economically disadvantaged families (Conger & Conger, 2002). Closeness and support between adult siblings is associated with higher self-esteem and life satisfaction, and less depression and loneliness (Milevsky, 2005). These benefits, which were found when just one sibling is supportive, may have even greater effects when all siblings provide support. Because support is associated with many types of well-being, it is possible that perceived personal achievement may also be positively impacted by support, particularly en masse from all siblings. Neither sibling group cohesion nor perceived personal achievement have been previously studied, so research on family support and general well-being is used to develop evidence for the hypothesis that sibling support is associated with higher achievements.

Support from parents is associated with feelings of self-worth (van Aken, & Asendorpf, 1997), low depression in adolescents (Levitt, et al., 1992), and high adolescent adjustment (Lamborn, & Nguyen, 2004). One study has found family support is directly associated with adolescent achievement, after controlling for parents' education levels (Kapikiran & Özgüngör, 2009). Others have cited the importance of a supportive environment to facilitate talent in any one area (Sosniak, 2001).

There may be a bi-directional effect between family members' support and athletic achievement. In one study, fathers were more supportive of their children when they were swimming at a higher level (Woolger & Power, 2000). So, whereas support may influence achievement, the opposite may also be true. Because parental support is strongly related to

positive achievements, it is predicted that sibling support will have a positive effect on personal achievement.

The effects of support may be akin to the effects of having more resources in the group, because supportive groups benefit from greater accessibility to emotional and physical resources. This expanded pool of information available to individuals in a cohesive group facilitates a higher quality performance than could be achieved by one person alone (Mesmer-Magnus & DeChurch, 2009). Beal, et al. (2003) states, "Cohesive groups should be able to use their groups' resources more efficiently because they know the members of the group better and are motivated to complete the task successfully" (p. 991).

There is abundant evidence that more cohesive families have stronger, more effective family resources than less cohesive families (Lavee & Olson, 1991, citing Olson, 1986). The sibling group's set of resources may also be an important contributor to well-being through advice, support, money, time, or other resources. These resources may be even more powerful when available in bulk. Family cohesion can predict children's well-being above and beyond what dyadic relationship measures in the family can predict (Richmond & Stocker, 2006). This finding is evidence of the potentially strong effects of sibling group cohesion.

Support can come in many forms (e.g. Avioli, 1986; Overall, Fletcher, & Simpson, 2010). Some forms of support include emotional support, which is providing comfort and security during times of stress and anxiety (Côté, 1999), practical, financial, or social support, which includes sharing friends and teaching social skills. Different forms of

support may have different effects on outcomes, (Overall, et al., 2010. This study includes several types of support including active support, introduction to activities, and being a role-model. Because there have been no previous studies of the effect of sibling support on achievement or its relationship to sibling group cohesion, specific hypotheses about types of support are not given. Instead, each type of support is expected to have a positive effect on both sibling group cohesion and perceived personal achievements.

Importantly, the measure used in this study taps the percent of siblings who offer a certain type of support. This is necessary because the measures of support needed to be aggregated to the individual level. While this study's measurement of support may have different effects than the relationship-level measure of support, it is a unique and interesting exploration of the effects of supportive relationships.

Expectations Theory

The more cohesive the group, the more pressure exists to conform and agree with group norms (e.g., Brawley, Carron, & Widmeyer, 1987; Carron, Prapavessis, & Grove, 1994). If the group norm is high achievement or accomplishment, and members of the group are expected to maintain that group norm, individuals may become highly successful. For example, high achieving athletes have cited their siblings as role models for strong work ethic (Côté, 1999). If every member of the sibling group is perceived as a hard worker, individuals should be motivated to continue this norm. Group norms in the family context might include high educational attainment, excellence in athletics, or participation in a specific hobby. Siblings from cohesive families are likely aware of the

family group norms, and when high achievement is the norm, the individuals may be highly motivated and successful.

Research shows that when low-achieving students are friends with high-achieving students, their academic performance is better than if they are friends with other low-achieving students (Altermatt & Pomerantz, 2005). This indicates a contagious aspect of academic achievement, and it is possible that these positive effects of achievement may exist in the sibling group as well. Those who come from a sibling group of high academic achievers may achieve higher academic success than those who do not, simply due to those around them. Of course, siblings share genes and upbringing, and may be similar in their high achievements due to genetic giftedness or parental support. Research shows high expectations from parents are associated with higher achievement (Côté, 1999; Sekowski & Siekanska, 2008). However, not all families with high ability and resources produce multiple high-achieving individuals, so perhaps it is the additional expectation from sibling relationships that helps some sibling groups outperform others.

Cohesion may influence expectations, and these expectations have the potential to increase perceived achievement. In a study of high athletic-achieving offspring, there was a consistent pattern of high parental expectations about their children's athletic achievement that was related to high achievement (Côté, 1999). Expectations from siblings may also be an important influencer of high achievement.

Studies have shown achievement orientation is associated with parental support (Acharya, & Joshi, 2011). Families who have clearly communicated expectations for achievement and study are associated with higher academic achievement (Sekowski &

Siekanska, 2008). Although studies of sibling impact on achievement and motivation have been largely ignored (Brustad, 1992), siblings can act as mentors, teachers, and encouragers just as parents do. Therefore some of the effects of parental support are also expected among siblings.

Shared Identity Theory

Groups have a significant impact on how people feel about themselves (Bettenhausen, 1991). Social identity theory posits that a person's self-concept is partially based on group membership, and individuals are motivated by self-esteem goals to favor their group over other groups (Tajfel & Turner, 2004). Individuals develop positive opinions of those who are also members of their group (the "in-group") to fulfill their underlying self-esteem needs (Tajfel & Turner, 1979). The more positively one perceives their group, the more highly they can perceive themselves. Shared identity, as defined in this study, is a strong tie to one's "in-group," such that the group is a large part of their identity.

When individuals accept the group as part of their identity, their motivations and behaviors change to put the group first. The group success feels like the individual's personal success, just as the group's failure is a personal failure. There are many ways individuals can develop a group identity, including reducing personal identity through coercion, dominance, dependence, or sacrifice. In this study sacrifice is studied as the path to shared identity. Sacrifice means the individual has become willing to put their personal well-being aside for the good of the other. To temporarily give up one's values of honesty and lie to one's parents to cover for a sibling is one form of sacrifice that commonly

occurs between siblings. Sacrificing for one's sibling may have positive or negative effects depending on its severity or frequency. This study tests the impact of sibling sacrifice on group cohesion and achievement. Group cohesion is expected to increase achievement through shared identity facilitated by sacrifice.

High group cohesion is associated with higher self-esteem among group members, less anxiety, greater work output, and an increased ability to deal with negative events (Brawley, et al., 1987; Hardy, Eys, & Carron, 2005; Julian, Bishop, & Fiedler, (1996) as cited in Carron, et al., 1994). Having a connected and strong shared identity with siblings may lay a foundation of self-esteem that is higher and more stable than others without this group connection. By feeling that one belongs, group cohesion can facilitate higher well-being and self-esteem.

The sibling relationship may create an expectation for other social relationships (Ponzetti & James, 1997). Using social learning theory, one would expect the social skills learned in one domain to be generalizable to the other (Oliva & Arranz, 2005). This would imply that those who have good sibling relationships also enjoy positive peer relationships. Many studies have found support for this theory (Downey & Condron, 2004; Kramer & Gottman, 1992; Kramer & Kowal, 2005; Oliva & Arranz, 2005; McCoy, et al., 1994). These extensive positive social experiences may lead to higher self-confidence and perceived worth. This, in turn, should be related to one's perception of personal achievements and ability to achieve. In this study, these relationships might manifest in the more social-oriented aspects of achievement, which include leadership, and positive relationships.

In contrast to sports, military, or friend groups, biology bonds siblings indefinitely, despite the level of contact and closeness they may have with one another. Even if siblings decide never to speak to one another again, they remain connected to one another through their shared genetics, and usually through other mutual family relationships. This sense of permanence is rare in non-familial groups, and might allow siblings to develop a confidence and security in their group membership, which allows them to endure struggles in other areas of their lives. Shared identity may develop between siblings due to this lasting bond.

Support, expectations, and shared identity (as studied through sacrifice) are three mechanisms through which cohesive sibling groups may increase perceived personal achievement. Each of these three theories predicts positive outcomes from high sibling group cohesion. Specific hypotheses are given that predict these relationships.

RESEARCH QUESTIONS

Research Question 1: Is sibling group cohesion unique from the aggregate of dyadic relationship qualities?

Hypothesis 1A: The average of sibling relationship positivity will positively predict sibling group cohesion, but will not fully explain all the variance in sibling group cohesion.

Hypothesis 1B: The standard deviation of sibling relationship positivity will negatively predict sibling group cohesion.

Hypothesis 1C: Each subscale of support will positively predict sibling group cohesion.

Hypothesis 1D: Sacrifice will positively predict sibling group cohesion.

Hypothesis 1E: Expectations will positively predict sibling group cohesion.

Hypothesis 1F: Average dyadic positivity and standard deviation of dyadic positivity will remain significant predictors of sibling group cohesion while controlling for all predictors.

Research Question 2: Does sibling group cohesion affect perceived personal achievement beyond the effects of dyadic sibling relationship quality? The following hypotheses are shown in Figure 1.

Hypothesis 2A: Sibling group cohesion will remain a significant predictor of perceived personal achievement even when controlling for the average of dyadic relationship quality.

Hypothesis 2B: Each subscale of support will mediate the relationship between sibling group cohesion and perceived personal achievement.

Hypothesis 2C: Sacrifice will mediate the relationship between sibling group cohesion and perceived personal achievement.

Hypothesis 2D: Expectations will mediate the relationship between sibling group cohesion and perceived personal achievement.

Hypothesis 2E: Support will remain a mediator for the relationship between sibling group cohesion and perceived personal achievement when controlling for shared identity and expectations.

Chapter 3: Methods

This study used an online questionnaire, developed by the researcher to explore sibling relationships in large families. The questionnaire took around 25-40 minutes to complete, and included 14 open-ended and 41 Likert or binary-scale items, and was conducted over six months in 2009. Adults with more than one sibling were nominated to take the survey, and their siblings were then contacted to complete the survey as well. The details about the nomination process, procedures, participants and specific measures are described below.

PARTICIPANT RECRUITMENT

Families with multiple sibling dyads were the focus of this study. The sample was purposefully selected through a unique nomination recruiting process. Nominators were contacted through flyers at the University of Texas at Austin, email requests from psychology graduate program coordinators associated with 30 to 40 various psychology programs at universities across the United States, word-of-mouth from the researcher and her colleagues, class announcements, and social networking sites such as Facebook. These nominators provided the name and email address of one sibling in a family of at least three "successful" adult siblings. The sibling was then asked to participate in the survey, but not told who nominated him or her.

The individuals who were nominated had to be part of a family in which all siblings were over 18-years-old and at least three siblings (including the individual nominee) were regarded as successful in some way. "Successful" was defined as "being good at something," including, but not limited to, "social, academic, athletic, artistic, or

professional domains". Beyond this brief definition, the interpretation of "successful" was left open to the nominators and therefore the participants vary greatly in level of "success." No participants were prevented from completing the survey, or eliminated once finished, based on level of "success."

The "successful" requirement was used for two reasons. First, the purpose of the larger study was to learn about achievement in families, so the sample needed to include moderately accomplished individuals. Extensive variation in measures of excellence exists; participants range from fast-food employees to Emmy winners. Second, the "successful" requirement was used as a tool to elicit higher participation from all siblings in the family. Because data from at least three siblings was required to portion out individual and relationship effects, complete data from families was essential. It was predicted that those who are seen as "successful" would be more willing to participate in research than those who are not. This is partially due to the natural human tendency to speak willingly about positive aspects of the self and because achievement is likely to be correlated with conscientiousness. This conscientiousness is likely correlated with a willingness to complete surveys. Although this assumption was not developed through previous research, it appears to have been supported in this study, as the completion rate is quite high (about one-third of the participants contacted filled out the survey), and ad hoc analyses show that this sample has a slightly higher rate of conscientiousness than the average college-age population.

PROCEDURES

The sibling who was nominated was contacted via an email from the researcher. The participant was invited to access a secure web address with a unique ID, provide informed consent, and complete the online survey regarding his or her successes and sibling relationships. Respondents were informed that they would also need to provide all siblings' names and email addresses, and that these siblings would be asked to participate in the survey. Once the first sibling filled out the survey, the contact information for all other siblings was available. The researcher then contacted each sibling, asking him or her to participate in the survey, and providing a link to the online survey. These participants also received an ID number, which allowed them to be tied to their other siblings in the database. Ongoing email communication was used to answer questions and facilitate participation. Each individual received up to three emails from the researcher, over several weeks, to encourage participation. Once all siblings in a family had completed the survey, they were entered into a drawling to win $50 per family member. One family was randomly selected, and these awards were mailed at the end of the study.

PARTICIPANTS

The sample included 1,561 relationships between 541 individuals from 184 families. Ninety-six of these families were "complete," meaning all siblings in the family completed the survey. This comprises 52% of the families and 60% of the participants. Of the remaining 88 families, 35 families were missing information from one sibling, and 53 families lacked information from two or more siblings. Reciprocal judgments, which happen when a sibling relationship is rated by each of the two siblings, are numerous due

to the large family sizes and completeness of the data; 1,186 relationships were reciprocally rated.

The participants ranged in age from 18 to 65 years. The average age of the participants was 29 (SD = 9.12). Participants were 65.4% female (n=354), and the average family size in the survey was 3.7 siblings with a range of 3 to 7 siblings (SD=1.06). The majority of sibling relationships were full biological siblings (91.9%). Half-siblings made up 5.3% of the relationships, and step-siblings, adopted, or undefined siblings were the remaining 2.8% of the relationships. Eighty-one percent of the participants identified themselves as White, 8.7% as Hispanic, 7.1% as Asian, and 1.6% as Black. A little over 1% of the participants was of mixed race or did not identify race. Although current location of residence was not recorded, the study recruited heavily from a medium-sized city in a southwestern state, and from universities across the country. Qualitative answers in the survey indicated that participants lived in many states and several countries outside the United States. One participant was dropped from the analysis because the survey was not completed in English.

MEASUREMENTS

Many scales from this survey were not used in the development of this dissertation study or its analyses. Only scales used in this study are presented here. The Internal Review Board for Human Subjects at the University of Texas at Austin approved the survey and procedures. Quantitative items were automatically downloaded into the statistical program SPSS, and the qualitative items were double coded as described below. The survey was designed so the participant would answer the questions about each

separate sibling. Although the participant could see and compare how they rated each sibling on a certain measure, they were never asked to rank siblings.

As stated earlier, multilevel modeling is necessary to study individuals within a family. In this study, three-level multilevel modeling is used. These three levels are: the relationship, individual, and family. Each is described below.

Relationship Level

The relationship level is also called the within-individual level, or the relationship-effects in the Social Relationship Model (Kenny & La Voie, 1984). The relationship level refers to characteristics between two specific people that are unique to that combination of people. For example, the age difference between two people is a relationship-level variable. Studying relationship-level variance in the sibling relationship is an investigation of how differently one person feels toward multiple siblings. A large variance at this level means a single individual has very different relationships with each sibling.

Individual Level

The individual level is also called the between-individual level or the actor-effects in the Social Relations Model (Kenny & La Voie, 1984). The individual level includes characteristics of the individual that do not change depending on the relationship. For example, a participant's age or gender is an individual-level measurement because it does not change depending on which sibling the participant is rating. Another individual-level variable can be the average of a relationship-level variable. For example, a participant feels varying levels of trust for each sibling (a relationship-level variable), but if averaged

together, the average amount of trust the participant feels towards their siblings in general is an individual-level variable. Some people may have more trust on average for their siblings than others, which represents individual-level variance. A large variance at the individual level means each individual has a very different average sibling relationship.

Family Level

The family level is also called between-family level or family-effects in the Social Relations Model (Snijders & Kenny, 1999). It is comprised of characteristics of the family as a whole, which are consistent across individuals and relationships. For example, the number of siblings in the family is a family-level variable. Other family-level variables include the averages of individual-level variables. For example, the average family age can be calculated by averaging the ages of each individual in the family. Some families may have older members than others, and this is a measure of family-level variance. A large variance at the family level indicates families are very different from one another on the variable in consideration.

The specific measures used in the study are described below and presented in Table 1. This table does not present all possible variables, but only these used in the analysis. Bolded measures in table one indicated the control variables that are used in all analyses. The specific measures used in the study are described below

RELATIONSHIP-LEVEL MEASURES AGGREGATED TO THE INDIVIDUAL LEVEL

Each of the variables used as outcomes in this study are individual-level variables. It is not possible to use a relationship-level variable to predict an individual-level variable,

so all predictors at this lower level must be aggregated to the individual level. Averaging is used because it has been shown to be equal to reaching a consensus as a group and to observed family behaviors (Feldman, Wentzel, &Gehring, 1989).

Support

Support in this study is operationalized into several forms. The open-ended question, "How did each sibling encourage you in your activities and pursuits?" was double coded using grounded theory to create 14 categories. Only categories that were mentioned 4% of the time or more, which means 58 people mentioned that type of support, were analyzed; thus four of the 14 categories were removed, including *Social* (3.8%), *Not applicable* (1.3%), *Financial* (1.1%), and *Showed me what not to do* (.4%). Additionally, two categories—*Other (6.6%)* and *Did not support me (4.6%)*—were not included because they did not offer interpretable information about support. Lastly, one category, "expectations," was studied separately because it may have a strong relationship with personal achievement, as described in the theoretical section.

These seven remaining support categories are listed in Table 2 along with a description of what they include. The coding schemes for the remaining support items used in this study are listed in Appendix A. The seven categories became seven binary variables, indicating that the participant received that type of support from each sibling. Then, the scores were summed across all siblings to bring the variable to the individual level. So if two siblings gave the participant emotional support, the participant would have a "2" for this category. Lastly, this score was then divided by the number of siblings the

participant had. Essentially, the final score indicates the percentage of siblings who provided this type of support to the participant.

Individuals often mentioned more than one way each sibling encouraged them, and therefore participants had several scores above zero for each of the eight categories. Responses were double coded and reliability analysis was run on 65% of the responses to assess reliability between coders. Inter-coder reliability was very good shown by Cohen's Kappa = .85.

Relationship Quality

A unique scale based on several previous scales assessed sibling relationship quality. These previously developed scales are: the Sibling Relationship Questionnaire (Furman & Buhrmester, 1985), the Lifespan Sibling Relationship Scale (Riggio, 2000), the Sibling Inventory of Behavior (Schaefer & Edgerton, 1981), and the Compassionate Love Scale (Sprecher & Fehr, 2005). The full set of survey questions that could be used in the positivity scale is presented in Appendix A. The 24 items correlated from -.11 to .66 with an average of .24. All items were entered into an exploratory factor analysis. This revealed five items that emerged as clearly separate from the others based on their consistent loadings. These items were removed to create the sacrifice scale. The remaining 19 items were factor analyzed again to create the positivity scale, described below. All items were answered using a Likert Scale from 1- "strongly disagree" to 5- "strongly agree."

Positivity

The 19 items regarding sibling relationships were factor analyzed and based on the Scree plot (Figure 2) and Eigen values (6.14 for the first factor and 1.70 for the second), and held together as one factor. Moderate correlations between the items ranged from -.12 to .66 (mean=.29). Items included, "This sibling set an example for me," "I included this sibling with my friends," "I see, talk, and email with them frequently," "I feel understood by this sibling," and "I trust this sibling to keep a secret from my parents."

Although there are subsets of questions that indicate different aspects of positivity, the composite scale positivity is a robust measure of good sibling relationship qualities and has a Cronbach alpha of .87.

In order to test the theory that sibling group cohesion (an individual-level variable) is separate and unique from dyadic sibling relationships (a relationship-level variable), sibling relationships must be aggregated to the individual level. Positivity was averaged across all sibling relationships for each participant, creating the "average dyadic sibling positivity" scale. However, averaging level-one variables alone ignores a great deal of information, such as the variance between sibling relationships. An average score of 3 on positivity may be due to the individual rating both siblings "3" or because s/he rated one sibling "1" and another "5." So, the same average rating can exist with very different family dynamics. So in addition to the average, the standard deviation of positivity was also computed. Some people are more likely to see all things in moderation and hover around the middle of the scale. Others express large differences in their relationships. The larger variation in scores may indicate simply a discriminating interpretation or a volatile

character. This quality is captured in the standard deviation in positivity for each sibling relationship.

Sacrifice

To test for shared identity, the scale of sacrifice was used because willingness to sacrifice is one way indicator of shared identity. The scale of sacrifice has five items, which describe a deep connection between siblings and their ability to be influenced and moved by each other. These items are: "I am willing to sacrifice my goals for this sibling," "This sibling's success is my success," "This sibling's failure is my failure," "I would do this sibling's school work," and "I would lie to my parents for this sibling." The Cronbach alpha is .62. Then the sacrifice scale was averaged for each participant across each sibling relationship, creating an individual-level scale.

INDIVIDUAL-LEVEL MEASURES

Demographics

Participants provided demographic information about their age and gender. Also recorded was their age difference from the family average age (calculated by averaging the ages of all siblings in the family). Because each participant reported the ages of all of their siblings, it was not necessary to restrict this measure to only those who had all siblings fill out the survey.

Achievement

Measuring achievement or talent can be difficult as there are no consistent ways to compare achievements in different domains, and because talent is hard to define (Vaeyens,

Lenoir, Williams, & Philippaerts, 2008). The limitations to using self-report are given in the discussion section. Many of the measures of achievement are easily defined and rated (e.g., a master's degree is higher than a bachelor's degree, lettering in three sports is more impressive than lettering in two sports), and do not require extensive interpretation. It should be understood that they are self-perceived and self-reported. So they may also tap a willingness to talk about one's accomplishments and an ability to recognize one's own accomplishments, as well as actual accomplishment. Therefore, this measure is referred to as "perceived personal achievement," so it is not assumed to be an outside objective measure of true accomplishment.

Perceived personal achievement was measured with two open-ended questions. "Why would your friends say you are amazing?" and "What are your greatest accomplishments, awards, achievements, etc.; feel free to only list the ones that matter the most to you."

This first question was designed to tap a broad range of domains and immeasurable qualities such as "I'm really outgoing" or "my dedication." The second question was designed to tap more specific achievements such as, "I had a 3.96 in college, received a full scholarship to medical school, and was the captain of my college lacrosse team."

Answers to both questions were combined and evaluated at the same time because answers sometimes were repeated or supplemented each other. Global coding was used; this is a form of coding in which the researcher creates categories based on the information collected, and continues to create and refine these categories until all information can be placed into a category. Twelve categories were formed, as listed in

Table 3. Twenty percent of responses were doubled-coded, resulting in a very strong agreement shown by Cohen's Kappa = .85.

Ten of the categories also had a rating system within the category to determine which answers indicated the highest achievement; this rating system is presented in Appendix B. For example, under artistic achievement, a participant could receive a 0 (meaning they did not mention it or it didn't reach the first level of achievement), or a score of 1 through 5 based on the level of achievement they accomplished. In order to determine, for example, the top level of a specific artistic pursuit such as dance or orchestra performance, online research was conducted to properly score each achievement.

Furthermore, three of the 10 rated categories had several types of codes within each category. For example, academic achievement was made up of seven types of academic achievements: degree, GPA/class rank in high school, GPA/class rank in college, academic awards, if they graduated early, publications, and standardized test scores. Each of these seven areas are scored on a 0-5 scale and averaged to create the academic category. The other two categories that have multiple codes are athletics and leadership, both of which focus on high school and college involvement and awards.

The two categories that did not involve any ranking were "determined" and "good looking." Many people mentioned these traits, but because they are somewhat unquantifiable and not attached to specific awards or accomplishments, they are scored with a 0 (did not mention) or a 1 (mentioned).

Because 10 of the 12 categories were rated on a 0-5 scale, three summary scores of achievement can be created: highest achievement, average achievement, and breadth of achievement. Each of these three conceptualizations has advantages and disadvantages, so each is used in this study to help create a complete and fair interpretation of achievement.

Highest achievement refers to the score of the highest item out of the 10 rated codes. An advantage to this conceptualization is that it indicates just how accomplished the individual is in his or her most gifted area. A disadvantage is that two binary codes cannot be used in this conceptualization, and therefore highest achievement scores can only be computed for the ten rated codes.

Average achievement measures how accomplished an individual is across many domains. An advantage to this form is that it awards those who are highly accomplished in many areas, whereas those who specialize in only one area, or who dabble in many areas but do not achieve greatness in any, are scored lower. This may be the most sensitive measure of accomplishment. The disadvantage to this form is it damages those who were modest or brief. It is certainly possible that some participants had high accomplishments in other areas, but chose only to list the one area that meant the most to them (as prompted by the question). Also, the two binary categories cannot be used in this conceptualization and therefore average achievement is only available using the ten codes. After descriptive statistics were completed, this measure was found to correlate highly with age (r=.25) and with the "highest achievement" measure (r=.84), so much so that it will not be used in this study.

Breadth of achievements measures the diversity of the participant's accomplishments. Unlike the former two conceptualizations, this form can use all 12 categories. Every code in which the person mentioned achievement is counted, creating a simple count variable of how many codes in which they have accomplishments. A disadvantage, again, is that this conceptualization rewards those who are more loquacious about their achievements and accomplishments.

In summary, there are 12 categories of achievements, ten of which are scored on a 0 to 5 scale and two that are binary. There are three ways these scores can be combined to create a summary score of achievement, two of which are used in this study. One score indicates the highest achievement rating, and one score indicates the count of all of the achievement categories mentioned.

Sibling Group Cohesion

The Sibling Group Cohesion Scale (SGCS) is an original, 12-item scale developed for this study to investigate how much a certain sibling feels connected and devoted to their sibling group as a whole. The full scale is presented in Appendix C. Participants answer questions regarding their entire group of siblings, not specific siblings alone. Two previously developed group cohesion scales inspired the items on the SGCS: the Group Environment Questionnaire (GEQ) and the Perceived Cohesion Scale (PCS).

The Group Environment Questionnaire (GEQ) (Carron, Widmeyer, & Brawley, 1985), designed for assessing cohesion in sports teams, was adapted to apply to families. The GEQ was the main source of inspiration for the SGSC because it is commonly used in studies of cohesion (Turman, 2003), and it has withstood tests of content, predictive, and

construct validity across small groups (Brawley et al., 1987; Carron et al., 1985; Estabrooks & Carron, 2000). The GEQ is easily adaptable to other group types (Carron et al., 2002; Dion, 2000), and it includes measures that are applicable to sibling groups.

This GEQ scale distinguishes between two types of cohesion: 1) group integration (an individual's perceptions about the closeness, similarity, and bonding within the group as a whole), and 2) individual attractions to the group ("an individual's perceptions about personal motivations acting to retain him or her in the group") (Carron et al., 2002, p. 170). It also distinguishes between task and social cohesion, which were defined previously.

Carron et al., (1985) describes the four subcategories in the GEQ: (A) Individual attractions to the group-task, the individual's perceptions of his or her personal involvement with the group's task. An example item is "I'm unhappy with my team's level of desire to win" (reverse scored). (B) Individual attraction to the group-social, the individual's perceptions of his or her personal acceptance and social interaction with the group. An example item is "Some of my best friends are on this team." (C) Group integration-task, the individual's perceptions of the similarity, closeness, and bonding that exists within the group as a totality around its collective task. An example item is "Our team is unified in trying to reach its goals for performance." And lastly, (D) group integration-social, the individual's perceptions of the similarity, closeness, and bonding that exists within the group as a totality around social concerns. An example item is "Our team members rarely party together" (reverse scored). Although the entire GEQ was not used, at least one question from each subcategory was adapted to the SGCS. The wording

and context of the GEQ questions were adapted to make the scale applicable to families. For example, the item "Our team would like to spend time together in the off season" was adapted to "Our sibling group likes to spend time together as much as possible." Other examples of questions adapted from the GEQ are: "My sibling group is motivated to be great" and "Being a part of this sibling group motivates me to improve myself." These questions were scaled on a five-point Likert scale ranging from 1="strongly disagree" to 5="strongly agree."

The Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) was also used in the design of the SGCS. PCS, designed to capture a sense of belonging and feelings of morale, has been validated in both large and small groups (Bollen & Hoyle, 1990; Chin, Salisbury, Pearson, & Stollak, 1999); and the scale is easily adaptable to the sibling group. Bollen and Hoyle (1990) state, "The generality of our scale makes it possible to examine the relationship of perceived cohesion in other groups" (p. 500). These authors specifically mention family cohesion as one of the areas their scale can encompass. Again, the scale was not used in its entirety and the wording was changed to apply to families. The question "I feel that I am a member of the ___ community" was changed to "I think of myself as part of a sibling group." Two other items were used from the PCS: "I am enthusiastic about being a part of my sibling group" and "Our group of siblings is one of the best I know."

Additional questions were added to the SGCS to collect information specific to sibling groups. These include "We have the same beliefs about politics, religion, etc." and "There is rarely any fighting or arguing between us when we are all together."

Appendix D presents descriptive information about sibling group cohesion. Exploratory factor analysis was run using principle component analysis with a Varimax rotation. Based on both the Scree plot and Eigen values of 7.00 for the first factor and 1.02 for the second, one factor was the best fit for the data. Three items ("Our ideas of excellence and personal goals are unified and connected," "We have the same beliefs about politics, religion, etc.," and "There is rarely any fighting or arguing between us when we are all together") loaded higher on the second factor, and would increase the scale alpha slightly if removed. However, the correlation matrix and scale alpha included with each indicate that they are still highly related to the other nine items, so they are still included. Therefore, all the questions can be averaged, resulting in the sibling group cohesion score. The Cronbach's alpha for this scale is .93, and the mean inter-item correlation is .53 (range .23 to .79), indicating the items are successfully assessing the same concept. Descriptive statistics for group cohesion and all other variables used in the study are described in Table 4.

FAMILY LEVEL MEASURES

Demographics

Each sibling reported their race, but because no siblings reported a different race from any of their siblings, race is a family-level variable. Five racial categories were created (White, Black, Hispanic, Asian, and other) but only a binary score indicating if they were White or of a different race was used in the analyses. Descriptive measures were used as a control in all analyses. These are: race, number of siblings in the family, and a binary measure of family relatedness (all full siblings are fully related or not), and

the percent of siblings who completed the survey was calculated and used as a control. Because all the variables used in the analyses are constructed by a single individual's account (e.g., how the participant rates each or their siblings), the complete and not-complete families were not separated. Analyses were run on all families, and the completeness of the family was used to control for any effects of having all members fill out the survey.

Chapter 4: Analysis

Following the guidelines of Campbell and Kashy (2002), hierarchical multilevel modeling was used to analyze information from within and between families (Kramer & Bank, 2005). It was necessary to use this strategy because relationships between siblings are nested within individuals (each individual has at least two relationships) and within the family (each family has at least 3 individuals). Therefore the variance due to the family, individual, and specific relationship needed to be separated. Multilevel modeling was used because it determines the association between variables while accounting for the clustering of relationships within individuals and families (Raudenbush & Bryk, 2002).

Data were first organized into three SPSS files, one for each of the three levels (relationship, individual, and family). In the relationship-level file, rows indicate relationships. In the individual-level file each row represents a separate individual. In the family-level file, each row represents a separate family. Identification variables were created to tie persons to their specific sibling relationships and to their family as a whole. Two family-level SPSS files were created; one that includes all families, and one that only includes families that had full participation. The full family-level file was used for all analyses except those that were run to explore differences between the complete-only and the all families.

Outcomes at any level can only be predicted by variables at the same or higher levels. Because perceived personal achievement and group cohesion are level-2 measurements, all the level-1 variables needed to be aggregated. All of the computed

variables that involved aggregating across relationships, or averaging within the family, were created and saved into the level-2 file for analysis.

Before exploring the hypothesis models, several descriptive analyses were run to provide insight into the data. These analyses include the average, standard deviation, range, and skewedness of each variable.

Next, each outcome variable was put into an unconditional model. This is a model with no predictor variables and is used to predict the percent of variance that each level describes. Because all three outcome variables (sibling group cohesion, highest achievement, and breadth of achievement) are level-2 variables, the unconditional models were two-level models using the individual and family levels. To run the unconditional models, the program HLM2 was used and no predictor variables were entered. The output gives the amount of variance explained by each level; with this, the percent of total variance was calculated and recorded for each level.

The first set of models tested predictors of sibling group cohesion, and the second set explored how three mechanisms are related to the relationship between sibling group cohesion and perceived personal achievement. Mediation by the dyadic positive relationship quality is tested throughout all models. In addition, the seven demographic variables of age, age difference from the average family age, gender, number of siblings in the family, if the family is White or not, completeness of the family, and if they are all full siblings or not are included in all the analyses.

PREDICTING GROUP COHESION

The first set of models investigates research question 1 and are labeled to correspond with the hypotheses. These models explore which variables are predictive of sibling group cohesion. Each model tests a separate predictor variable, and the final model combines all predictor variables to test the strength of them against each other.

Model 1A uses the average of dyadic sibling relationship positivity to predict sibling group cohesion while controlling for the seven control variables. A two-level regression model was run in HLM2 to explore if dyadic sibling relationship positivity is a predictor of sibling group cohesion. The effect of average dyadic sibling positivity on sibling group cohesion was recorded. Because this model included the seven control variables, a second analysis, without any control variables, was run to explore the percent of variance explained by dyadic sibling relationship positivity alone. For both levels, the variance remaining was recorded and subtracted from the variance at each level in the unconditional model. Then this difference was divided by the total variance in the unconditional model. This gives a percentage of how much of the total variance is explained by the average of the dyadic sibling positivity measure.

Model 1B used the standard deviation of dyadic sibling relationship positivity to predict sibling group cohesion while controlling for the seven control variables. A two-level regression model was run in HLM2 to explore if the standard deviation of dyadic sibling relationship positivity is a predictor of sibling group cohesion.

Model 1C was run seven times, one for each of the seven support subscales. These models tested if different types of support predict sibling group cohesion while controlling

for the seven control variables. A two-level regression model was run in HLM2 to explore if support is a predictor of sibling group cohesion.

Model 1D used the scale of sacrifice to predict sibling group cohesion while controlling for the seven control variables. A two-level regression model was run in HLM2 to explore if sacrifice predicts sibling group cohesion.

Model 1E used the expectation scale to predict sibling group cohesion while controlling for the seven control variables. A two-level regression model was run in HLM2 to explore if expectations predict sibling group cohesion.

Model 1F used average dyadic positivity, standard deviation of dyadic positivity, sacrifice, expectations, and all forms of support as predictors of sibling group cohesion. This model explored which of these predictor variables had the strongest predictive power while controlling for all others and the seven control variables, using the program HLM2.

PREDICTING ACHIEVEMENT

The second set of models explore research question 2: which mechanisms mediate the relationship between sibling relationship quality and perceived personal achievement? To test for mediation, the steps in Barron and Kenny (1986) were followed. To show mediation, each leg of the model must be tested and shown to be significant, and the predictor variable must have a significant effect on the outcome. Mediation exists when the effect of the main variable is reduced when the mediation variable is included. The significance of each mediation was tested using the multilevel structural equation modeling (MSEM) developed by Preacher, Zyphur, & Zhang (2010). This model is

preferred over other mediation testing models because it accounts for the 2-level nested variables (Preacher, et. al., 2010).

Each model in the second set of analyses has two possible outcome variables (breadth and highest personal achievement measures) and requires four analyses according to Barron and Kenny (1986). In all analyses, the average dyadic positivity was included to test if cohesion has a separate effect from the sum of the relationships. Therefore, hypothesis 2A is tested not only independently, but in all models under research question 2. Also, the seven variables of age, age difference from the family average age, gender, number of siblings in the family, White or not, completeness of the family, and full sibling or not are included in all the analyses.

The first step in all of the following models was to test for the relationship between sibling group cohesion and perceived personal achievement (while controlling for the average dyadic sibling positivity and the seven control variables). The second step in each analysis was to test for the relationship between sibling group cohesion and the predictor variable (e.g., support, shared identity, or expectations). The third step in each model was to test the relationship between the predictor variable and perceived personal achievement. The final step in each model was to use sibling group cohesion, the predictor variable, the average dyadic sibling positivity, and the seven control variables to predict perceived personal achievement. All of these analyses were done in HLM2 using a two-level regression model. The entire set of models was completed two times, one set using the outcome "highest achievement" and one set using the outcome "breadth of achievement."

Model 2B used each subscale of support to test for mediation between sibling group cohesion and perceived personal achievement. Each of the seven support scales were independently tested using the set of four analyses described above.

Model 2C used sacrifice to test for mediation between sibling group cohesion and perceived personal achievement. This variable was tested using the set of four analyses described above.

Model 2D used the scale of expectations to test for mediation between sibling group cohesion and perceived personal achievement. The variable was tested using the set of four analyses described above.

Model 2E used all seven of the support variables as well as sacrifice, expectations, the average of dyadic sibling positivity, and the seven control variables to test for mediation between sibling group cohesion and perceived personal achievement. All variables were tested in the same model to explore which variables are the strongest predictors. This model again followed the set of four analyses described above.

Chapter 5: Results

The descriptive analyses for all variables used in the models are listed in Table 4, and shows the range, average, and skewedness of each variable, among other descriptive variables. The results from the unconditional models are shown in Table 5; they indicate that sibling group cohesion is 88% explained by the individual level and 12% by the family level. The majority of the variance (92-93%) for both achievement outcomes is explained by the individual level.

MISSING DATA

Although all attempts were made to ensure all participants completed the survey in full and that all siblings from a family filled out the survey, there were some missing data. To learn about the missing data, level of completeness (number of siblings who completed the survey divided by the number of total siblings) was used to explore differences between complete and incomplete families.

Analyses indicate that the level of completeness was not significantly related to family age or average relatedness. The completeness was unsurprisingly related to number of siblings in the family; the more siblings in the family, the less likely all members were to have completed the survey. Also, White families were more likely to be complete than those from other races. In general, those families who had more positive relationships were likely to have higher completeness.

The first set of models explores what predicts sibling group cohesion, and the second set explores which variables mediate the relationship between sibling group cohesion and perceived personal achievement. Together they contribute an important perspective on the development of the sibling group cohesion measure.

PREDICTING GROUP COHESION

Model 1A tested if the average of the dyadic sibling relationships would be predictive of sibling group cohesion. Results show sibling group cohesion was found to be strongly and positively predicted by the average of sibling dyadic positive relationships, as shown in Table 6. The average of dyadic positivity predicts sibling group cohesion, while controlling for the seven control variables. This means the more highly one rates all their siblings in positivity, the more likely they are to have high sibling group cohesion. Hypothesis 1A was supported: The average of dyadic sibling positivity is a positive and significant predictor of sibling group cohesion. This is both expected and encouraging with regard to establishing the validity of the sibling group cohesion measure. This also supports the theory that strong group cohesion is adaptive and separate from enmeshment. Enmeshment is associated with a host of negative relationship and well being qualities (Barber & Buehler, 1996; Manzi, et al., 2006) so, the strong relationship between positive qualities and sibling group cohesion indicates sibling group cohesion and enmeshment are separate constructs.

To explore further just how much of sibling group cohesion is explained by average dyadic sibling positivity, the amount of variance remaining at each level was recorded form the model using only dyadic sibling relationship positivity as a predictor.

These results are located in Table 7; they show that 17.5% of the variance at the individual level and 73.5% of the variance at the family level is explained by average dyadic sibling positivity. For reference, when all the variables are included in the model, a total of 18.1% of the individual level and 97.5% of the family level variance are explained. Thus, average dyadic relationship positivity explains more individual-level variance than any other variable studied, and a large amount of the family-level variance.

Two additional ad hoc analyses were conducted to further explore the relationship between dyadic sibling relationship positivity and sibling group cohesion: a bivariate correlation and an exploratory principal component analysis. In the principal component analysis, sibling group cohesion, average, and standard deviation of dyadic sibling positivity were constrained to one factor. These factor loadings represent how strongly each variable load on a broader factor. Results from both the correlation and principal component analysis are listed in Table 8 and show that sibling group cohesion and average dyadic sibling relationship positivity are strongly related. However, neither analysis indicates they are identical constructs, and it is not yet known if they have the same predictive power. Research question two explores the relationship between both constructs and the outcome of perceived personal achievement. Hypothesis 1A was again supported by these results, which indicates that dyadic sibling relationship positivity is similar to, but not exactly the same as, sibling group cohesion.

Model 1B tested if the standard deviation of dyadic sibling positivity would predict sibling group cohesion. Sibling group cohesion was found to be significantly and negatively predicted by the standard deviation of sibling dyadic positive relationships,

while controlling for the seven control variables. This model is shown in Table 9 and indicates that the greater the difference in how one sees their sibling relationship positivity between different siblings, the less likely they are to have strong sibling group cohesion. Hypothesis 1B was supported: The standard deviation of dyadic sibling positivity is a negative and significant predictor of sibling group cohesion. This again supports the validity of the sibling group cohesion measure, because cohesion generally is an indicator of little variance between group members.

Model 1C tested if each type of support predicts sibling relationship quality, and results are shown in Tables 10-16. Active, emotional, and setting-an-example types of support were positively predictive of sibling group cohesion, while controlling for the seven control variables. Academic, competition, introducing-to-activities, and being a role model were not predictive of sibling group cohesion. Recall that these support measures indicate the proportion of siblings who offer this support. In other words, the closer one gets to 100% of their siblings offering this specific type of support, the more likely they are to have high sibling group cohesion. Hypothesis 1C was partially supported: Active, emotional, and setting-an-example types of support are positive and significant predictors of sibling group cohesion, but the other four measures of support are not significant predictors.

Model 1D tested if sacrifice predicts sibling group cohesion. Results, presented in Table 17, show sacrifice was not found to be a significant predictor of sibling group cohesion, while controlling for the seven control variables. Hypothesis 1D was not supported; sacrifice was not found to be a predictor of sibling group cohesion.

Model 1E tested if expectations predict sibling group cohesion. Results, presented in Table 18, show the percent of siblings producing high expectations is not a significant predictor of sibling group cohesion, while controlling for the seven control variables. Hypothesis 1E was not supported: Expectations do not predict sibling group cohesion.

Model 1F tested all of the predictor variables together (average sibling dyadic positivity, standard deviation of dyadic sibling positivity, sacrifice, expectations, and all seven types of support) to see which effects would remain. All seven control variables were also included in this model. The results, presented in Table 19, show dyadic sibling relationship quality remained a strong, positive, and significant predictor. The standard deviation of dyadic sibling positivity was also a strong and significant predictor in the negative direction. Some forms of support became non-significant predictors when dyadic sibling positivity and other predictors were included in the model. These include emotional support and active support.

Example type of support remained a strong, significant positive predictor of sibling relationship quality, even while controlling for both forms of dyadic positivity. This means sibling group cohesion is more than the sum of its parts (average sibling relationship positivity); it is instead a unique scale of group relationship reflecting aspects of positivity and support. Hypothesis 1D was supported: The average of the dyadic sibling positivity was a positive predictor of sibling group cohesion, even when controlling for the other predictor variables. Additionally, the standard deviation of dyadic sibling positivity was a negative and significant predictor of sibling group cohesion. The positive effect of

example type of support was not hypothesized, but indicates that sibling group cohesion is more than just a measure of sibling positivity.

Two control variables were consistently positive and significant predictors of sibling group cohesion throughout the analyses investigating research question 1: family completeness and number of siblings. These results indicate that the higher the proportion of sibling group members who complete the survey, and the more siblings there are in the family, the more cohesive the sibling group is. To further explore the effect of sibling group size, this variable was plotted with sibling group cohesion to assess if there is a linear relationship between sibling group size and group cohesion. Results show even sibling group sizes have a moderately higher group cohesion than those with odd numbers. This supports the common belief that groups of three commonly result in one person feeling left out.

PREDICTING ACHIEVEMENT

Mediation models were used to test the second research question and to investigate which mechanisms mediate the relationship between sibling group cohesion and perceived personal achievement. Because each model requires four separate analyses, and several of these analyses are repetitive, only the final "Step 4" of the Barron and Kenny (1986) model is presented in its entirety. However, in each table, the important effect sizes from previous steps are indicated, so effect size comparisons can be made. In all models, all seven control variables were included, but these effects generally remained consistent and are not reported, except in Step 4 to provide clarity. The significance of each mediation was also tested using the MSEM method (Preacher, et. al., 2010). Both achievement

variables of "highest" and "breadth" are explored, creating two sets of analyses. Results are discussed separately and then in summary in the discussion. First, the results for the outcome of "highest achievement" are presented.

PREDICTING HIGHEST ACHIEVEMENT

The first step to exploring this research question is "Step 1" of Barron and Kenny (1986). It directly tests hypothesis 2A. The goal is to test if there is a relationship between sibling group cohesion and highest perceived personal achievement. The analysis was run both with and without controlling for the seven control variables and the average of sibling dyadic relationship quality. Results, presented in Table 20, show sibling group cohesion is a significant and positive predictor of highest perceived personal achievement. The power and significance of this effect decreases slightly with the inclusion of average dyadic sibling relationship positivity.

In addition to the model created to test this effect directly, dyadic sibling positivity was also included as a control variable in models: 2B, 2C, 2D, and 2E. Results are shown in Tables 21-30. Overall, results indicated that average dyadic sibling positivity does not strongly mediate the relationship between sibling group cohesion and highest perceived personal achievement, while controlling for the seven control variables and nine predictor variables. In fact, the mediation effect of group cohesion on the power of dyadic sibling relationships is stronger than the mediation effect of dyadic positivity on sibling group cohesion. The average dyadic sibling relationship positivity is a slightly significant predictor of highest achievement in most models without group cohesion. However, this relationship is typically reduced to non-significance and halved in power when sibling

group cohesion is included in the model. In no case is average dyadic sibling positivity more significant than sibling group cohesion. In contrast, the effect of sibling group cohesion is only slightly reduced in strength with the addition of average dyadic sibling positivity. In summary, hypothesis 2A was supported: Sibling group cohesion continues to predict highest achievement when controlling for the average dyadic sibling positivity, although its strength and significance is slightly decreased.

Model 2B tests if each type of support is a mediator to the relationship between sibling group cohesion and perceived personal achievement. Each of the seven types of support was used independently (presented in Tables 21-27) to assess which types of support might affect the sibling group cohesion-achievement relationship while controlling for the seven control variables and average dyadic sibling positivity. In summary, no forms of support mediate the relationship between sibling group cohesion and achievement individually.

In greater detail, the MSEM test shows academic, active, emotional, example, introduced-to-activities, and role model types of support are moderately significant ($p<.1$) mediators of the relationship between group cohesion and highest achievement at the between family level. This means greater support between any two siblings in the same family doesn't change the impact of group cohesion on highest achievement. But greater support from siblings as a whole slightly reduces the relationship between group cohesion and highest achievement.

Other results from this model indicate sibling group cohesion reduces the effect of any example-type support. The effect size and significance of example support was

moderately reduced when group cohesion is included in the analysis. Active support and introduction-to-activities support also are both significant predictors of personal achievement and are not affected by the inclusion of sibling group cohesion. All other measures of support were not significant predictors of highest achievement with or without the inclusion of sibling group cohesion. Hypothesis 2B was not supported: these measures of support are not significant mediators in the relationship between sibling group cohesion and perceived personal achievement.

Model 2C tests the hypothesis that sacrifice mediates the relationship between sibling group cohesion and highest perceived personal achievement. The results, presented in Table 28, indicate sacrifice is a negative and significant predictor of perceived personal achievement, which is unaffected by the presence of sibling group cohesion in the model, while controlling for the seven control variables. Sacrifice did not mediate the effect of sibling group cohesion on highest achievement, as based on the MSEM model. Nor did sibling group cohesion change the effects of sacrifice. Hypothesis 2C was not supported: The effect of sibling group cohesion on highest perceived personal achievement is not mediated by sacrifice.

Model 2D tests if the measure of expectations mediates the relationship between sibling group cohesion and highest perceived personal achievement. The seven control variables were also included in this model. The results, presented in Table 29, indicate expectations have little effect on perceived personal achievement with or without controlling for sibling group cohesion. Therefore mediation is not established. When using the MSEM model, a moderately significant ($p<.1$) effect of expectations at the family

level was found. Meaning, higher expectations in the family slightly reduces the effect size of sibling group cohesion on highest achievement. Overall, hypothesis 2D was not supported: The relationship between sibling group cohesion and perceived personal achievement was not mediated by expectations.

Model 2E tests all potential mediation variables in one model to explore which variables are the strongest mediators of the relationship between sibling group cohesion and highest perceived personal achievement. These results, shown in Table 30, indicate that when controlling for the other predictors—example type support, introduce-to-activities type support, active support, and emotional support—are all positive predictors of perceived personal achievement. Also, sacrifice remains a slightly significant, negative predictor of perceived personal achievement. When combined in the same analysis, the composite of these support variables does mediate the relationship between sibling group cohesion and highest perceived personal achievement. This indicates that sibling group cohesion is a proxy not for a single type of support, but instead a dynamic mix of an interactive, instruction-based, active type of relationship between all siblings in the group. Hypothesis 1F was partially supported: certain types of support (example, introduce-to-activities, active, and emotional) are mediators of the relationship between group cohesion and perceived personal achievement when combined in one analysis. Additionally, sacrifice also remained a significant mediator of the relationship between sibling group cohesion and perceived personal achievement. This group of predictors, along with the seven control variables, mediated the effect of sibling group cohesion on highest perceived personal achievement.

Age was the only control variable that was a significant predictor of highest achievement throughout the analyses. This is not surprising due to the fact that the rating system for achievement often involved an age component (e.g. Bachelor's degree rated lower than a graduate degree).

PREDICTING BREADTH OF ACHIEVEMENT

Many of the effects from highest achievement models were similar in the breadth of achievement models. The first step is "Step 1" of Barron and Kenny (1986), which directly tests hypothesis 2A. The goal is to test if there is a relationship between sibling group cohesion and breadth of perceived personal achievement. The analysis was run both with and without controlling for the seven control variables and the average of sibling dyadic relationship quality and is presented in Table 31. Results show sibling group cohesion is a significant and positive predictor of breadth of perceived personal achievement. The power and significance of this effect decreases slightly with the inclusion of average dyadic sibling relationship positivity.

In addition to the model created to test this effect directly, dyadic sibling positivity was also included as a control variable in models: 2B, 2C, 2D, and 2E. Results are shown in Tables 32-41. Overall, results indicated that average dyadic sibling positivity does not strongly mediate the relationship between sibling group cohesion and breadth of perceived personal achievement while controlling for the seven control variables and nine predictor variables. In fact, the mediation effect of group cohesion on the power of dyadic sibling relationships is stronger than the mediation effect of dyadic positivity on sibling group cohesion. The average dyadic sibling relationship positivity is a slightly significant

predictor of breadth of achievement in most models without group cohesion. However, this relationship is typically halved in power and reduced to non-significance when sibling group cohesion is included in the model. In no case is average dyadic sibling positivity more significant than sibling group cohesion. In contrast, the effect of sibling group cohesion is only slightly reduced in strength with the addition of average dyadic sibling positivity. In summary, hypothesis 2A was supported: Sibling group cohesion continues to predict breadth of achievement when controlling for the average dyadic sibling positivity, although it's strength and significance is slightly decreased.

Model 2B tests if each type of support is a mediator to the relationship between sibling group cohesion and breadth of perceived personal achievement. Each of the seven types of support was used independently (presented in Tables 32 -38) to assess which types of support might affect the sibling group cohesion-achievement relationship while controlling for the seven control variables and average dyadic sibling positivity. In summary, no forms of support mediate the relationship between sibling group cohesion and achievement individually.

In greater detail, MSEM results show academic, active, competition, emotional, example, introduced-to-activities, and role model type support were significant ($p<.05$) mediators of the relationship between sibling group cohesion and breadth of achievement at the between-family level. This means an increase of support between any two siblings does not change the effect of sibling group cohesion on breadth of achievement. However, an increase of support from the siblings as a whole slightly reduces the effect of sibling group cohesion on breadth of achievement.

Other results from the mediation indicated sibling group cohesion slightly reduces the effect of active support, but, active support remains a significant predictor of breadth of perceived personal achievement. Introduction-to-activities and role model support are both strong and highly significant predictors of personal achievement and are not affected by the inclusion of sibling group cohesion. Emotional support and competition support both become more significant and powerful predictors when included in the final model with all predictor variables. All other measures of support were not significant predictors of highest achievement with or without the inclusion of sibling group cohesion. Hypothesis 2B was not supported: these measures of support individually are not significant mediators in the relationship between sibling group cohesion and perceived personal achievement.

Model 2C tests the hypothesis that sacrifice mediates the relationship between sibling group cohesion and breadth of perceived personal achievement. The results, presented in Table 39, indicate that sacrifice is a negative and significant predictor of perceived personal achievement, which is unaffected by the presence of sibling group cohesion in the model, while controlling for the seven control variables. Sacrifice did not mediate the effect of sibling group cohesion on breadth of achievement, as indicated by the MSEM model. Nor did sibling group cohesion change the effects of sacrifice. Hypothesis 2C was not supported: The effect of sibling group cohesion on breadth of perceived personal achievement is not mediated by sacrifice.

Model 2D tests if the measure of expectations mediates the relationship between sibling group cohesion and breadth of perceived personal achievement. The seven control

variables were also included in this model. The results, presented in Table 40, indicate that expectations have little effect on breadth of perceived personal achievement with or without controlling for sibling group cohesion. MSEM results indicated that expectations mediated the relationship between sibling group cohesion and breadth of achievement at the between-family level. This means that greater expectations in the family reduces the effect of sibling group cohesion on breadth of achievement. However, because the effect was small overall, and not significant at the within-family level, mediation was not established. Hypothesis 2D was not supported: The relationship between sibling group cohesion and breadth of perceived personal achievement was not mediated by expectations.

Model 2E tests all potential mediation variables in one model to explore which variables are the strongest mediators of the relationship between sibling group cohesion and breadth of perceived personal achievement. These results, shown in Table 41, indicate that when controlling for the other predictors, introduce-to-activities type support, active support, role model support, competition support, and emotional support are all positive predictors of perceived personal achievement. When combined in the same analysis, the composite of these support variables mediates the relationship between sibling group cohesion and breadth of perceived personal achievement. This indicates that sibling group cohesion is a proxy not for a single type of support, but instead a dynamic mix of an interactive, instruction-based, warm relationships between all siblings in the group. Hypothesis 1F was partially supported: certain types of support (active, introduce-to-activities, role model, competition, and emotional) are mediators of the relationship

between group cohesion and breadth of perceived personal achievement when combined in one analysis.

Two control variables were consistently strong predictors of breadth of achievement. Number of siblings in the family and gender were found to be significant and consistent predictors of breadth of achievement. Those who come from larger families and females had greater breadth of achievements.

In summary, sibling group cohesion was found to be related to, but separate from, the average of dyadic sibling positivity in all analyses. Sibling group cohesion is a significant and strong predictor of perceived personal achievement, and this relationship is mediated by the combination of several types of support. The implications of these results are discussed below.

Chapter 6: Discussion

Summary and Implications

The goals of this study were to: describe the importance of developing a measure of sibling group cohesion; define sibling group cohesion and create a measurement to test it; test the validity of the measure using related constructs; and explore how sibling group cohesion predicts perceived personal achievement.

The results of the first research question indicate that sibling group cohesion is predicted by, but still unique from, the average and standard deviation of dyadic sibling relationship positivity. Meaning, sibling group cohesion is unique from dyadic positivity. Results from the second research question indicate sibling group cohesion has a significant effect on perceived personal achievement, even after controlling for dyadic sibling relationships. However, this effect dissipated after including multiple measures of support. This shows that the mechanism driving sibling group cohesion might be experiencing a high percentage of siblings who offer assistance, are warm, and are inspiring.

Before further exploring the research questions, the percent of variance at each level of the model should be discussed. The distribution of variance in sibling group cohesion across the two levels was highly skewed towards the individual level. This indicates that there are greater differences among individuals within the same family than between families for how much group cohesion they perceive. While this might initially seem counterintuitive, it is actually fairly unsurprising considering the extensive research

showing that individuals do not agree on perceptions of family relationships (Feldman, et al., 1989; Kerig, 1995). In fact, when specifically reporting on family cohesion, there has historically been low within-family agreement (e.g., Cole & Jordan, 1989; Feldman et al., 1989; Kerig, 1995; Nøvik & Solem, 2003). This study indicates a similar lack of agreement among siblings when reporting on sibling group cohesion.

Another explanation for this finding is the skewedness of the data around the high end of the group cohesion scale. The average score on this scale is 4 on a 5-point scale, which suggests these families are all somewhat high on sibling group cohesion. Therefore, if all families are at the high end of the scale, even slight variations between two siblings' perceptions might explain the high individual-level variance.

To further explore the measurement of sibling group cohesion, the percent of variance explained by key measures was explored. Results show the variance in sibling group cohesion lies mostly at the level-1, and 17.5% of this level-1 variance was explained by just the inclusion of average dyadic sibling positivity. While average dyadic sibling positivity explained the largest amount variance, in comparison to any other variable in the models, it didn't explain all variance in sibling group cohesion. Additionally, because example type support still remained a significant variable in the model, even after including average and standard deviation of dyadic sibling positivity, there is reason to believe sibling group cohesion is different from simply the average and standard deviation of dyadic sibling positivity.

The validity of sibling group cohesion is supported because sibling group cohesion is predicted by the average of dyadic relationship positivity and negatively related to the

standard deviation of dyadic sibling relationship positivity. One would generally expect a cohesive unit to have positive dyadic relationships, although there are conceivable situations where this may not be true, as described previously. These results indicate that there certainly is a component of sibling group cohesion that is reflective of positive dyadic relationships, and this indicates good face validity for sibling group cohesion.

The number of siblings in the family and completeness of the family are both positively related to sibling group cohesion. To explore further the relationship between family size and sibling group cohesion, a graph and predictor model was created. Upon visualization of this relationship, sibling group cohesion appears to be highest for families of six offspring, followed by four, then five, three, and seven. This supports the public thought that having an odd number of children increases the chances of one being left out.

It is not surprising that completeness of the family is a positive predictor of sibling group cohesion because those who are more cohesive are more likely to contact one another to encourage and discuss the survey completion. This communication likely led to greater family completion. Also, those who have high sibling cohesion are likely to be proud and eager to share these strong feelings.

It was not just the average and standard deviation of dyadic sibling positivity that predicted sibling group cohesion. Also, active, emotional, and example type support were significant predictors of sibling group cohesion when studied alone. This means that sibling group cohesion is not simply the sum of its parts, but is also affected by the consistency of receiving these types of support from all of one's siblings.

Active support refers to supportive actions such as attending the participant's athletic games, or providing rides or physical assistance. While this type of support is visible, and therefore might be expected to have negative effects (Bolger, Zuckerman, & Kessler, 2000), it has a positive effect on the sibling relationship in this study. This could be because this type of support was generally offered during pleasant or exciting times, and not just in times of need. The more siblings provide this active support, the more likely the participant will feel group cohesion with his or her siblings.

Emotional support is also predictive of sibling group cohesion. Research has shown that emotional support is related to positive relationships (Côté, 1999). Emotional support involves giving advice, listening to troubles, and providing emotional stability. Participants who felt a high proportion of their siblings provided emotional support, were more likely they to feel they have group cohesion.

The example type of support is the only type of support that remained significant after controlling for dyadic sibling positivity. This type of support indicates that the participant felt a majority of their siblings set an example for them, and that they were inspired by and learned from each sibling. Age and age difference were controlled for in all models, so this effect is not simply an indication of being younger in the family. In fact, it may be the willingness to learn from all of one's siblings that drives sibling group cohesion.

Both sacrifice and expectations did not show strong evidence for being highly related to sibling group cohesion. For sacrifice, this may be because sacrifice is related to feeling that others are an extension of the self. This quality is not essential for sibling

group cohesion. In fact, these questions may actually tap enmeshment more than cohesion. One definition of enmeshment is being undifferentiated from one another (Minuchin, et al., 1967, as cited in Kinnier, et al, 1990). Several of the items on this scale might measure this tendency, such as being willing to sacrifice one's goals for another, and feeling so connected to others that other's achievements feel like one's own. If this scale is related to enmeshment, it would unsurprisingly be negatively related to perceived personal achievement. Without another measure of shared identity available in this study, conclusions cannot be made about the effects of shared identity in general on group cohesion and achievement. Future work should explore other facilitators of shared identity.

Regarding expectations, participants rarely scored high on this measure, so there may not be sufficient variation to capture these effects. Also, while some people may thrive with this type of encouragement, others may feel pressured and pushed too hard. The effect of expectations on sibling group cohesion might be highly variable based on other factors not captured in this study such as similarity of interests.

In research question two, when using either achievement outcome variable, sibling group cohesion was a positive and significant predictor of perceived personal achievement, even when controlling for the average of dyadic sibling relationship positivity. The more cohesion the individual perceives in their sibling group, the higher their perceived personal achievement. This result alone, while only the first leg of the mediation analyses, is an important and significant contribution to the literature on family science and group cohesion. It shows sibling group cohesion has a stronger relationship

with some adaptive outcomes than the average of dyadic relationships. In sum, this gives evidence that sibling group cohesion is greater than the sum of its parts and is a powerful influence on personal well-being. This result aligns with previous studies of family cohesion, which found linear relationships between family cohesion and other measures of well-being (e.g., Barber & Buehler, 1996; Fisiloglu & Lorenzetti, 1994; Manzi et al., 2006). Also, this result is even more strong because it was true for both outcome measures, making it a particularly robust finding.

Although not directly tested in this study, the effects of achievement on group cohesion could be studied in the future. Because the relationship from cohesion to achievement was high, it could also be that high group member achievement increases one's willingness to be cohesive with the group.

While the effect of sibling group cohesion on achievement is strong, it is reduced in strength and significance when average dyadic sibling positivity is included in the model. This makes sense in light of the amount of variance they share. In fact, the reduction of strength of the effect size is in the ballpark of the percent of variance average dyadic sibling positivity explains (17.5%). In the greater picture of family relationships, this finding is novel, important, and significant. Not only has perceived personal achievement not been extensively explored in this way, but the effects of siblings on personal achievement have also rarely been studied. This result indicates there may be powerful and interesting relationships between siblings and achievements that deserve further attention.

In addition to this major finding, three theories were tested to explore potential mediators to the sibling group cohesion-perceived personal achievement relationship. These theories were tested for each of the two achievement outcomes: highest and breadth. First, the highest achievement results are discussed.

Active support was a significant predictor variable of highest achievement. This finding nicely aligns with the support theory, which linked support with a greater use of resources (Beal et al, 2003). Active support is a potential measure of resources, and results show perceived personal achievement is facilitated by siblings who are more willing to help one another. For example, a participant who had all of his or her siblings in attendance at a special performance would have reached a higher level of achievement than a participant who had a lower proportion of siblings attending the event. The effect of active support remained in the full model even when controlling for all the variables.

The introduction-to-activities type of support was also a positive and significant predictor of achievement. This form of support signifies that the participant reported a high proportion of siblings who had introduced her or him to an activity such as a sport, instrument, or hobby. This type of support is different from example support (which doesn't involve an introduction to a specific activity) and role model support (which means the siblings looked up to the participant). Also, the activities that were introduced are not necessarily the same activities, nor are they necessarily the activity in which the participant achieved their highest success. However, this finding shows that having a sibling to learn from directly can affect high achievement. Just how these activity

introductions affect perceived personal achievement is not part of the scope of this study, but provides an intriguing question for future work.

The example support type was a significant predictor of highest achievement and was partially mediated by the inclusion of sibling group cohesion. The effect of example support became significant again in the final model, which included all predictor variables. These results indicate that looking up to a higher proportion of one's siblings can increase one's highest perceived personal achievement.

Interestingly, emotional support was not significantly predictive of either type of achievement when in the model with only average dyadic sibling relationship quality and the seven control variables. However, when combined with the other types of support and predictor variables, it became a strong and significant predictor of both highest and breadth of achievements. This indicates a suppressor effect, which means a variable is in the model that increases the predictive validity of a different variable when it is included in a regression model (MacKinnon, Krull, & Lockwood, 2000). The suppressor variable (or combination of variables) was not systematically tested because it wasn't part of the scope of this study. Future studies could explore which variables act as suppressor variables to emotional support.

Another explanation for the power of emotional support existing only in the full model is that in order for sibling relationships to have an impact on achievement, one needs to have a high percentage of siblings who offer not just emotional support, but also active, example, and introduction-to-activities type support as well. It appears these types

of support in combination with one another create a group dynamic that can have powerful results. Perhaps this combination is fundamentally what sibling group cohesion is.

Lastly, highest achievement was predicted by age, which is easily explained by the fact that the rating system inherently rewarded those who are older (e.g., being a leader of a club in college was rated higher than being a leader of a club in high school). All models controlled for age, which reduces the severity of this limitation, but another conceptualization of achievement is used as well, to help balance out this limitation.

In sum, the relationship between sibling group cohesion and perceived personal achievement is mediated by the combination of several types of support. Not all forms of support produce the same outcomes (Overall, et al., 2010). Active, introduction-to-activities, and emotional support, when combined, mediate the effect of sibling group cohesion on highest perceived personal achievement. Together these results help to define the construct of sibling group cohesion as greater than the sum of its parts and driven by effects of consistently active and warm sibling relationships.

The highest achievement and breadth of achievement outcomes had some similarities and some differences. The effects of the average and standard deviation of dyadic sibling positivity were the same as discussed previously. Also, both outcomes were significantly predicted by active, introduction-to-activities, and emotional support. Because the two constructs are somewhat unique form one another, the similarities are interesting and important. Together, these three forms of support paint a picture of interactive, warm, friendly, teaching-oriented relationships that have the potential to increase personal achievement.

Breadth of achievement was predicted by some variables that were not significant for highest achievement. The role model type support means the *participant* was the inspiration for other siblings. Although not a traditional interpretation of support receipt, many participants listed the fact that their siblings looked up to them as an encouraging experience. Being a role model for a higher percentage of siblings is predictive of having a greater breadth of achievement. This might be because participants felt they needed to "test the waters," try things out, and learn about a variety of things to best support their siblings. The lack of significance of this variable to predict highest achievement is also interesting. Perhaps being a role model for one's siblings prevents one from being able to commit sufficiently to one pursuit to achieve highly.

Competition type support is also a moderately significant predictor of breadth of achievement, only when included in the model with all predictor variables. Competition support represents a feeling of competitiveness that the participant perceived as encouragement. Because the question asks the sibling to write about how each sibling provided encouragement, the competition themes from these answers may not be reflective of harsh or extreme competition. The results indicate competition and comparison might drive individuals to pursue a greater variety of activities. This can be interpreted in two ways. First, the participant may have experienced competition with a sibling, and thus decided to differentiate and pursue a new activity (increasing breadth). On the other hand, the participant may have previously been participating in separate activities, pursued competition with a sibling, and adopted the sibling's activity as well.

Some siblings may pursue activities only because they want to be like, or better than, their sibling.

Lastly, breadth of achievement was predicted by gender and family size. This might be because those from large families must learn to speak up and be assertive, which results in greater communication about their achievements. Also, females tend to be more communicative than men, so females may have been more likely to write extensively about their accomplishments than men.

Each of the three original theories that were proposed for how sibling group cohesion have varying levels of support form these results. The shared identity theory is not supported because sacrifice had a moderate and negative relationship with highest achievement. This shows that feeling extremely interconnected to one's siblings through willingness to sacrifice may be damaging to achieving high accomplishments. This could be because the scale of sacrifice, which includes measures of being willing to sacrifice one's goals for the other, could possibly be tapping enmeshment, where the individuals cannot separate themselves from the group (Minuchin, Montalvo, Guerney, Rosman, & Schumer, 1967, as cited in Kinnier, Brigman & Noble, 1990). High shared identity, just like high enmeshment, could be associated with negative outcomes (Barber & Buehler, 1996; Manzi et al., 2006) and reduce motivation or ability to excel in activities outside of the group. The theory predicts high sibling group cohesion should be predictive of well-being measures such as self-esteem (Tajfel & Turner, 1979). It is possible these relationships exist, but the effect on personal achievement is negative.

The encouragement theory is unsupported because there was no relationship found between high encouragement and achievement. This is somewhat surprising considering the power of group norms (e.g., Brawley, Carron, & Widmeyer, 1987; Carron, Prapavessis, & Grove, 1994) and frequent research citing effects of parental expectations on children's achievements (eg. Côté , 1999; Sekowski & Siekanska, 2008). However, the difference may be because this measure of encouragement does not tap group norms and is instead the percent of siblings who encourage the individual to perform highly. In order to test the encouragement theory accurately, one should compare achievement group norms to achievements of individuals. Also, parental expectations may function very differently from sibling expectations. In this study, expectations of the sibling group were not found to be significant predictors of perceived personal achievement.

The most evidence was found for the support model. Many of the support variables were predictive of one or both of the achievement variables. Support at the dyadic level has been associated with positive emotional health and well-being (e.g., Milevsky, 2005), so the relationship of support to perceived personal achievement adds to the literature in a coherent way. People in cohesive groups have been shown to achieve higher performance than one person alone (Mesmer-Magnus & DeChurch, 2009). These effects in the sibling group may be driven by enjoying warm, interactive relationships and a wiliness to learn from one another. These families might be enjoying the effects of having multiple talents and perspectives from which each person can learn and grow. Additionally, cohesive sibling groups may be able to use these resources in a more effective way, which has been shown in studies of family cohesion (Lavee & Olson, 1991, citing Olson, 1986).

Many researchers have emphasized the importance of studying all members of the family (e.g. Kramer & Bank, 2005; Minuchin, 1985), but there has not yet been a measure of sibling group cohesion to justify these claims. This study gives strong support for these suggestions and indicates that sibling group cohesion is unique from the sum of its parts, and is a strong predictor of perceived personal achievement. This result should be encouraging to group research because the complicated nature of round-robin design often prevents researchers from designing studies to collect all information from each family member. Using this measure of sibling group cohesion does not require full participation from all family members and instead can be asked of just one participant per family. Thus, researchers can ask just these twelve questions and produce a measure that is more predictive of perceived personal achievement than an aggregation of 56 or more questions.

Taking a step back and exploring the big picture, perhaps what is important is not *which* sibling relationship variable is predictive of achievement, but that sibling relationships do have a consistent effect on perceived personal achievement. Sibling relationships are a unique and interesting predictor rarely explored in the context of achievement, and this study gives evidence of the potentially powerful effects of siblings. The consistent conclusion from this study is that certain positive features of sibling relationships can have a significant impact on one's perceived achievements.

STRENGTHS

The strengths of the study are numerous as it was purposefully designed to reduce the common limitations of other sibling research. Many researchers agree that sibling relationships and their effects can only be understood in the context of the larger family

system (Hetherington, 1994; Richmond & Stocker, 2006), and they highlight the importance of using both members of the dyad to study sibling relationships (Milevsky, 2005; Shanahan, et al., 2008). In this study, nearly 100 families had *all* siblings complete the study, allowing for an exploration of variables at the relationship, individual, and family levels. To have complete participation from all members in the sibling group is extremely rare.

In addition, each of the siblings in this study completed questions about *all* of their sibling relationships, which is also very rare. These fully complete families allow for creation of complex scales of sibling relationships, such as the standard deviation of dyadic sibling positivity, which adds to the depth of understanding of sibling relationships in large families. The insights gained from these analyses are new, unique, and important to guiding future research.

Newman (1994) stated, "Very many studies have oversimplified actual sibling constellations by over-generalizing findings from two-child families, or derived from one or two siblings selected from a larger group. This methodology masks intra-sibling group differences and the factors associated with these" (p. 43). The field is in need of large studies that utilize perspectives from all members of the family. Numerous researchers cite their use of only one sibling as a limitation (Kretschmer & Pike, 2009; Milevsky, 2005; Myers & Bryant, 2008; Riggio, 2006; Spitze & Trent, 2006; Tucker, et al., 1997), and they emphasize the importance of using new perspectives to explore sibling relationships (Oliva & Arranz, 2005). Shortt & Gottman (1997) commented, "It would be interesting to examine more than one sibling relationship in the family and how a close sibling

relationship with one sibling is different from a distant relationship with another sibling in the same family" (p. 160). This study does exactly what these previous researchers have called for. It examines multiple siblings per family and explores all of the participant's sibling relationships.

This study is the first systematic attempt to develop a sibling group cohesion measure. Thus, another strength of the study is that it validates a novel measure while demonstrating its power and importance at the same time. Sibling group cohesion is an essential and powerfully predictive feature of sibling group relationships. This study can be used for both defining the measure and exhibiting its importance.

A final strength of the study is that it begins to fill a gap in sibling research that explores how sibling relationships affect personal achievements. Positivity in sibling relationships are predictive of so many measures of well-being (e.g., Bank, et al., 2004; Conger & Conger, 2002; Kim, McHale, Crouter, & Osgood, 2007; Milevsky, 2005), but are rarely explored as predictors of achievement. This study is one of the first to explore this connection and results indicate this is a very promising relationship that deserves further exploration.

LIMITATIONS

Although there are many strengths to the study, there are also several limitations. First, the sample is unique and unrepresentative of the general population, and therefore may produce different results from other studies. The participants were nominated because they were perceived as accomplished, and therefore may be more homogeneous in many areas as compared to the general population. Information about socioeconomic status was

not collected, but it is possible that those who are more accomplished are also higher in socioeconomic status than those who have had fewer opportunities for accomplishment. If the study were replicated in a more diverse group, the effect sizes would be expected to be stronger due to the greater variance in the sample. Thus the significant effects in this study are important because they exist even in a limited sample.

Despite the reduced variance in the achievement levels of the sample, the sample was not nominated for extraordinary or unordinary sibling relationships. The impact of cohesion, support, and sacrifice is not expected to be significantly or systematically different for successful siblings versus those with less success.

Second, achievements were self-reported and they may not reflect accurate or complete pictures of the participants. Issues with defining expertise have been prevalent throughout the research (Sloboda, 2002), and the two perspectives used to measure achievement are an attempt to diversify achievement so that limitations can be balanced and strengths utilized. Issues still exist for each conceptualization and are best interpreted in conjunction with one another. At the heart of the issues is that people vary in their wiliness to report (or even acknowledge) their achievements. This variation may be dependent on self-esteem and confidence, which is why these measures are carefully referred to as "perceived" personal achievements. How self-esteem relates to one's willingness to report their accomplishments needs to be explored further.

Because some of the ratings have an inherent age aspect tied to them, such that only those who are older can achieve the higher scores, there are limitations to using the "highest" score of achievement. As seen in the results, this measure of achievement is

closely related to age. Also, the scoring of achievement measures may produce higher scores for those who received rewards for their achievements. Not all individuals have the same opportunity to receive rewards, so this scoring of achievement may be unfair. For breadth of achievement, this measure rewards those who ware more verbose with a higher score. Some people may have a lower interest in talking about their achievements, or may see their achievements as less note-worthy and therefore do not write extensively about their accomplishments. However, when both measures are explored together, a general understanding of achievement can be created with some confidence. In summary, all measures of achievement have limitations. Using two very different measures allows for a reduction in these limitations.

Third, the study is not longitudinal or experimental, so causal relationships cannot be tested. Future studies should improve this by tracking the same siblings over time. Significant cohesion knowledge can be gained by studying the same sibling group over time, during times of stress, transition, and development.

Fourth, there is a lack of information about conflict and rivalry in sibling relationships. If the negative aspect of sibling relationships were also measured, it would be possible to separate out sibling relationships that are characterized by low positive and low negative from those that are low positive and high negative. Each of these limitations provides opportunities for further research about sibling group cohesion. This study begins the conversation which future research can continue.

FUTURE STUDIES

This study tests the validity of sibling group cohesion and shows it has power in predicting perceived personal achievement. There are many more factors that should be studied to explore this construct further. First, sibling group cohesion should be compared to family cohesion (which includes all siblings and parents). Many studies have shown the positive power of family cohesion (e.g. Fisiloglu & Lorenzetti, 1994; Rice et al., 1990; Baldwin & Hoffmann, 2002), and both family cohesion and sibling group cohesion should be explored for unique and joint predictive power. Sibling and family cohesion should be studied in the same population to identify any common and unique features and effects. It is possible that sibling group cohesion simply taps family group cohesion and they could potentially have the same characteristics and effects. On the other hand, they may be entirely unique, with one occurring without the other. Future studies should ask: can one exist without the other? Is one more predictive of certain types of emotional well-being or achievements? And, what are the features of families that create one or both types of cohesion?

Secondly, this study only investigated measures of dyadic positivity, so measures of negativity in the sibling relationship would add to the understanding of sibling group cohesion. The measures of dyadic sibling positivity, as well as the predictor variables of support, sacrifice, and expectations were chosen because they could potentially be mechanisms through which sibling group cohesion acts. However, researchers should also explore what does not relate to sibling group cohesion. Studying measures of conflict, rivalry, and disengagement can add important insight.

Third, future studies could explore the effects of sibling group cohesion and support on specific types of achievements. Research indicates that positive sibling relationships are predictive of achievement in academics (Stewart, 2008; Feldman & Wentzel, 1990) and athletics (Côté, 1999), so it could be insightful to see how sibling group cohesion affects different types of achievements differently. The outcome variable could be expanded even more to explore how sibling group cohesion affects other aspects of well-being such as self-esteem, friendship quality, romantic relationship satisfaction, income, depression levels, alcohol use, and many more. Because positive dyadic sibling relationships have been predictive of so many emotional and social measures of well-being (e.g., Howe, et al., 2001; Kim, et al., 2007; McCoy, et al., 1994; Pike, et al., 2005), it would be expected that sibling group cohesion could add to or mediate the predictive power of dyadic sibling relationships.

Fourth, sibling group cohesion should be studied over time. This sample spanned all of adulthood form 18 to 65, but was heavily weighted toward young adulthood. It is predicted that this measurement of sibling group cohesion would not be useful in studying child or adolescent sibling group cohesion, and thus further development of a scale that can tap these other age groups would add to the understanding of sibling group cohesion. Additionally, the daily, yearly, or event based fluctuations in sibling group cohesion in the same families across time could highlight the continuous or dynamic nature of sibling group cohesion in adulthood that is still unknown. Exploring sibling group cohesion in a longitudinal and in diverse age groups is an important next step.

CONCLUSION

This study supports Minuchin's (1985) statement that individuals in the family should be studied in the context of the family group. It was not the dyadic relationship qualities that consistently predicted perceived personal achievement. Instead, it was the unique measures of group experience that were powerful enough to predict this measure of personal well-being. The study of group cohesion in many domains groups has shown powerful effects on both group performance and personal well-being (e.g. Carron, et al, 2002; Mullen & Cooper, 1994). Extensive literature has also shown strong relationships between dyadic sibling positivity and well-being (e.g. Kim, et al, 2007; Conger & Conger, 2002; Lee, et al., 1990). Often studies that found these strong relationships only involved one of the multiple sibling relationships within the family. If sibling group cohesion was also considered, perhaps these effects would be even stronger and more consistent.

Although siblings have not been studied using the group cohesion lens before, this study shows that strong sibling group cohesion can also have benefits for personal well-being. Richmond & Stocker (2006) showed cohesion can be a better predictor of positive outcomes than the sum of the dyadic relationships, and this study finds the same result for sibling group cohesion. This interesting discovery appears to be true, not only at the family level, but also in sibling relationships, and warrants further exploration of group dynamics within the family.

This study makes four major contributions to the fields of family research and group cohesion. First it calls attention to the fact that family members should be studied in context of their larger groups (Minuchin, 1985), and that the sibling group is an important

but rarely studied feature of family research. Second, it defines sibling group cohesion and develops a measurement scale to test it in families. Third, it validates this measure by finding sibling group cohesion is not simply an average of dyadic positivity, but a dynamic construct of admiring one's siblings and feeling consistently positive towards them. Lastly, sibling group cohesion is established as a powerful measure, which can predict perceived personal achievement even when controlling for dyadic sibling positivity. Sibling group cohesion is a unique and important construct that should be further explored and potentially incorporated into all studies of sibling relationships in large families.

Tables

Table 1. All Variables Used in Analyses

(Original level if different from where it is listed; bolded variables remain in all analyses)

Level 2	Level 3
	White or not
	Sibling group size
	All siblings in family full siblings (1)
	Family completeness
Gender	
Age	
Age difference from Family Average	
Group cohesion	
Achievement - two categories	
Average dyadic sibling positivity (1)	
Standard deviation in dyadic siblings positivity (1)	
Average rating of Sacrifice (1)	
Percent of siblings offering support - seven forms (1)	
Percent of siblings offering expectations (1)	

Table 2. Support Categories Used in the Analyses

Type of Support	Valid percent	Description
Emotional support	48.1	Talks, listens, kind, patient, vague "supports me"
Set an example	22.4	I look up to them, mentors me, compliments sibling
Role model	11.7	Sibling looked up to me, I was a role model for
Introduced to activities	10.4	Introduced me to activities/interests.
Expectations	8.2	Told me to be the best, never give up, I can do anything, challenged me, pushed me
Active support	6.6	Attended games, bought artwork, gave me articles, any other action (not emotional)
Academic support	5.5	Helped me with homework, college applications, etc.
Competition	4.0	Competed with me, I wanted to be better than

Table 3. Achievement Categories

Achievement category	Range	Number of variables combined	Categories involved
Academic	0 to 5	7	
Athletic	0 to 5	4	
Leadership	0 to 5	5	
Professional	0 to 5	1	
Artistic	0 to 5	1	
Volunteering	0 to 5	1	
Travel/language	0 to 5	1	
Relationships	0 to 5	1	
Religion	0 to 5	1	
Popularity	0 to 5	1	
Determined	0 or 1	1	
Good looking	0 or 1	1	
Highest	0 to 5	8	First 10
Average	0 to 5	8	First 10
Count	0 to 10	10	All 12

Table 4. Descriptive Statistics for all Variables in the Study

Variable	n	Mean	SD	Min	Max	Skewness Statistic	Scale alpha Reliability
Group Cohesion	469	4.02	.86	1	5	-1.53	.93
Average Dyadic Sibling Relationship Positivity	469	3.01	.50	2.17	4.84	-.50	.87
Standard Deviation Dyadic Sibling Relationship Positivity	469	.33	.29	0	1.86	1.70	
Academic Support	469	.06	.16	0	1.0	2.99	
Active Support	469	.07	.22	0	1.0	3.30	
Competition	469	.04	.16	0	1.0	3.84	
Emotional Support	469	.48	.21	0	1.0	.172	
Example Support	469	.22	.32	0	1.0	1.47	
Introduction to Activities Support	469	.10	.22	0	1.0	2.20	
Role Model Support	469	.12	.24	0	1.0	2.07	
Sacrifice	469	3.48	1.04	1	5	-.32	.62
Expectations	469	.08	.21	0	1.0	2.60	
Age	469	29.36	9.29	18	65		
Male	469	.33	.47	0	1.0	.65	
Age Difference from Family Average	469	-.01	3.2	-10.50	9.50	-2.90	
Sibling Group Size	183	3.7	1.06	3	7.0	1.56	
Family White or not	183	.85	.36	0	1.0	-1.90	
Family Completion	183	.77	.28	.14	1.0	-.80	
All Full Siblings or not	183	.95	.23	0	1.0	-2.56	
Highest Achievement	469	2.54	1.48	.14	5.0	.24	
Breadth of Achievement	469	3.07	1.37	1.0	7.0	.38	

Table 5. Unconditional Means Models for All Three Outcomes

Outcome Variable	Percent of Variance at Level-1	Percent of Variance at Level-2
Group Cohesion	88%	12%
Highest Achievement	93%	7%
Breadth of Achievement	92%	8%

Table 6. Hypothesis 1A: The Average of Sibling Relationship Positivity will Positively Predict Sibling Group Cohesion

Variable	Coefficient (significance)
Intercept	3.32***
Family completeness	.23
All full siblings	-.04
White	-.10
Number of siblings	.17***
Age (centered at 29)	-.00
Age difference from family average	-.00
Male	-.05
Mean positivity	.88***

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 7. Proportion Reduction in Explained Variance For Positivity Alone and Model 1F with All Predictor Variables

	Average dyadic sibling positivity	All predictor variables
Level 1	17.5%	18.1%
Level 2	73.5%	97.5%

Table 8. Correlation and Principal Component Factor Analysis between Sibling Group Cohesion and Dyadic Sibling Positivity

	Principal component factor analysis	Bivariate correlation	
	Component score	Average dyadic sibling relationship positivity	Standard deviation of sibling relationship positivity
Sibling group cohesion	.76	.49**	-.21**
Average dyadic sibling relationship positivity	.85		-.37**
Standard deviation of sibling relationship Positivity	-.66		

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 9. Hypothesis 1B: The Standard Deviation of Sibling Relationship Positivity will Negatively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.70***
Family completeness	.23
All full siblings	-.04
White	-.17
Number of siblings	.17***
Age (centered at 29)	-.00
Age difference from family average	-.01
Male	-.17*
Standard deviation of dyadic positivity	-.89***

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 10: Hypothesis 1C: Academic Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.05***
Family completeness	.49*
All full siblings	.11
White	-.14
Number of siblings	.58**
Age (centered at 29)	-.00
Age difference from family average	-.00
Male	-.12
Academic support	.32

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 11. Hypothesis 1C: Active Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.09***
Family completeness	.46*
All full siblings	.10
White	-.14
Number of siblings	.15**
Age (centered at 29)	-.00
Age difference from family average	-.00
Male	-.11
Active support	.33+

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 12. Hypothesis 1C: Competition Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.15***
Family completeness	.47*
All full siblings	.10
White	-.13
Number of siblings	.14**
Age (centered at 29)	-.00
Age difference from family average	-.01
Male	-.11
Competition	.35

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 13. Hypothesis 1C: Emotional Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	2.92***
Family completeness	.45*
All full siblings	.09
White	-.12
Number of siblings	.16***
Age (centered at 29)	-.01
Age difference from family average	-.01
Male	-.10*
Emotional support	.36***

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 14. Hypothesis 1C: Example Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.14***
Family completeness	.45*
All full siblings	.06
White	-.13
Number of siblings	.14**
Age (centered at 29)	-.01
Age difference from family average	-.01
Male	-.14+
Example support	.38**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 15. Hypothesis 1C: Introduced to Activities Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.10***
Family completeness	.47*
All full siblings	.10
White	-.13
Number of siblings	.15**
Age (centered at 29)	-.01
Age difference from family average	-.01
Male	-.13*
Introduced to activities	.11

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 16. Hypothesis 1C: Role Model Support will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.10***
Family completeness	.48
All full siblings	.11
White	-.13
Number of siblings	.15**
Age (centered at 29)	-.01
Age difference from family average	-.01
Male	-.13
Role model	.01

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 17. Hypothesis 1D: Average Sacrifice will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	2.93***
Family completeness	.47*
All full siblings	.12
White	-.13
Number of siblings	.15**
Age (centered at 29)	-.00
Age difference from family average	-.01
Male	-.13
Sacrifice	.04

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 18. Hypothesis 1E: Expectations will Positively Predict Sibling Group Cohesion.

Variable	Coefficient (significance)
Intercept	3.07***
Family completeness	.48*
All full siblings	.11
White	-.13
Number of siblings	.15**
Age (centered at 29)	-.00
Age difference from family average	-.01
Male	-.12
Expectations	.17

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 19. Hypothesis 1F: Average Positivity and Standard Deviation Positivity will remain Significant Predictors of Sibling Group Cohesion while Controlling for all Predictors.

Variable	Coefficient
Intercept	.54
Family completeness	.09
All full siblings	-.14
White	-.14
Number of siblings	.18***
Age (centered at 29)	-.00
Age difference from family average	.00
Male	-.07
Sacrifice	-.00
Example	.33**
Competition	.12
Role model	.17
Introduced to Activities	.20
Active support	.26
Academic support	.33
Expectations	.04
Emotional support	.13
Mean positivity	.74***
SD positivity	-.42**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 20. Hypothesis 2A: Group Cohesion Predicts Highest Achievement (with and without controlling for positivity)

Variable	Coefficient (significance) Without Positivity	Coefficient (significance) With Positivity
Intercept	1.41*	.96
Family completeness	.13	.11
All full siblings	.07	.05
White	.26	.26
Number of siblings	-.00	.01
Age (centered at 29)	.04***	.04***
Age difference from family average	.01	.01
Male	-.23	-.22
Group cohesion	.20**	.16+
Average dyadic positivity		.16

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 21. Hypothesis 2B: Academic Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Academic	Without Group Cohesion
Intercept	1.00		
Family completeness	.10		
All full siblings	.04		
White	.27		
Number of siblings	.00		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.22		
Group cohesion	.16+	.15+	
Academic support	-.31		-.26
Average positivity	.16	.16	.31*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 22. Hypothesis 2B: Active Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Active	Without Group Cohesion
Intercept	1.04		
Family completeness	.08		
All full siblings	.04		
White	.23		
Number of siblings	.02		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.19		
Group cohesion	.14	.15+	
Active support	.72*		.77*
Average positivity	.15	.16	.28*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 23. Hypothesis 2B: Competition Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Competition	Without Group Cohesion
Intercept	.87		
Family completeness	.11		
All full siblings	.05		
White	.26		
Number of siblings	.01		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.23		
Group cohesion	.16+	.15+	
Competition	.31		.29
Average positivity	.17	.16	.32*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 24. Hypothesis 2B: Emotional Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Emotional Support	Without Group Cohesion
Intercept	1.01		
Family completeness	.11		
All full siblings	.05		
White	.26		
Number of siblings	.01		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.22		
Group cohesion	.16+	.15+	
Emotional support	.13		.14
Average positivity	.13	.16	.27+

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 25. Hypothesis 2B: Example Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Example	Without Group Cohesion
Intercept	1.09		
Family completeness	.11		
All full siblings	.05		
White	.26		
Number of Siblings	.01		
Age (centered at 29)	.04***		
Age difference from family average	.02		
Male	-.25+		
Group cohesion	.14	.15+	
Example support	.39+		.44*
Average positivity	.15	.16	.28*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 26. Hypothesis 2B: Introduced to Activities Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Intro to Activities	Without Group Cohesion
Intercept	.97		
Family completeness	.05		
All full siblings	.03		
White	.22		
Number of siblings	.02		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.23+		
Group cohesion	.15+	.15+	
Introduced to activities	.86**		.88**
Average positivity	.16	.16	.30*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 27. Hypothesis 2B: Role model Support Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Role Model	Without Group Cohesion
Intercept	.93		
Family completeness	.09		
All full siblings	.03		
White	.27		
Number of siblings	.01		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.21		
Group cohesion	.16+	.15+	
Role model	.29		.32
Average positivity	.17	.16	.31*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 28. Hypothesis 2C: Sacrifice Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Sacrifice	Without Group Cohesion
Intercept	1.32		
Family completeness	.13		
All full siblings	-.01		
White	.25		
Number of siblings	.00		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.21		
Group cohesion	.16+	.15+	
Sacrifice	-.13*		-.13*
Average positivity	.20	.16	.35*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 29. Hypothesis 2B: Expectations Mediates the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Expectations	Without Group Cohesion
Intercept	.96		
Family completeness	.11		
All Full siblings	.05		
White	.26		
Number of siblings	.01		
Age (centered at 29)	.04***		
Age difference from family average	.01		
Male	-.22		
Group cohesion	.15+	.15+	
Expectations	-.04		-.07
Average positivity	.16	.16	.31*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 30. Hypothesis 2E: Support Remains a Mediator for the Relationship Between Sibling Group Cohesion and Highest Perceived Personal Achievement when Controlling for the other Predictors.

Variable	Coefficient (significance)	Without Predictors	Without Group Cohesion
Intercept	1.53*		
Family completeness	-.02		
All full siblings	-.10		
White	.18		
Number of siblings	.02		
Age (centered at 29)	.05***		
Age difference from family average	.01		
Male	-.22		
Group cohesion	.10	.15+	
Sacrifice	-.11+		-.11+
Example	.61**		.65**
Competition	.53		.53
Role model	.45		.46
Introduced to activities	1.06***		1.07***
Active support	.94**		.97**
Academic	-.13		-.10
Expectations	.36		.36
Emotional support	.52**		.53**
Average positivity	.05	.16	.13

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 31. Hypothesis 2A: Group cohesion Predicts Breadth of Achievement (with and without controlling for positivity)

Variable	Coefficient (significance) Without Positivity	Coefficient (significance) with positivity
Intercept	.98+	.58
Family Completeness	.55+	.53+
All Full siblings	.49+	.47
White	-.12	-.12
Number of siblings	.14+	.15*
Age (centered at 29)	-.00	-.00
Age difference from family average	.01	.01
Male	-.34*	-.33*
Group cohesion	.21**	.17*
Average positivity		.14

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 32. Hypothesis 2B: Academic Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Academic	Without Group Cohesion
Intercept	.56		
Family completeness	.54+		
All full siblings	.47		
White	-.12		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.33		
Group cohesion	.17*	.17*	
Academic support	.19		.23
Average positivity	.14	.14	.32*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 33. Hypothesis 2B: Active Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Active	Without Group Cohesion
Intercept	.65		
Family completeness	.50		
All full siblings	.46		
White	-.15		
Number of siblings	.16*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.30*		
Group cohesion	.16+	.17*	
Active support	.78**		.84**
Average positivity	.13	.14	.29*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 34. Hypothesis 2B: Competition Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Competition	Without Group Cohesion
Intercept	.41		
Family completeness	.54+		
All full siblings	.47		
White	-.12		
Number of siblings	.16*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.35**		
Group cohesion	.17*	.17*	
Competition	.55		.51
Average positivity	.17	.14	.34**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 35. Hypothesis 2B: Emotional Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Emotional Support	Without Group Cohesion
Intercept	.63		
Family completeness	.53+		
All full siblings	.47		
White	-.11		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.33*		
Group cohesion	.17*	.17*	
Emotional support	.11		.12
Average positivity	.11	.14	.29*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 36. Hypothesis 2B: Example Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Example	Without Group Cohesion
Intercept	.59		
Family completeness	.52+		
All full siblings	.46		
White	-.12		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.33*		
Group cohesion	.17*	.17*	
Example support	.03		.08
Average positivity	.14	.14	.31*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 37. Hypothesis 2B: Introduced to Activities Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Intro to Activities	Without Group Cohesion
Intercept	.58		
Family completeness	.46		
All full siblings	.45		
White	-.16		
Number of siblings	.16*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.34**		
Group cohesion	.16+	.17*	
Introduced to activities	1.05***		1.09**
Average positivity	.15	.14	.31*

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 38. Hypothesis 2B: Role Model Support Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Role Model	Without Group Cohesion
Intercept	.45		
Family completeness	.48		
All full siblings	.41		
White	-.09		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.00		
Male	-.30*		
Group cohesion	.16+	.17*	
Role model	1.09***		1.13***
Average positivity	.18	.14	.34**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 39. Hypothesis 2C: Sacrifice Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Sacrifice	Without Group Cohesion
Intercept	.88		
Family completeness	.55+		
AllfFull siblings	.42		
White	-.12		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.33*		
Group cohesion	.17*	.17*	
Sacrifice	-.11+		-.10+
Average positivity	.18	.14	.35**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 40. Hypothesis 2D: Expectations Mediates the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement.

Variable	Coefficient (significance)	Without Expectations	Without Group Cohesion
Intercept	.56		
Family completeness	.52+		
All full siblings	.46		
White	-.11		
Number of siblings	.15*		
Age (centered at 29)	-.00		
Age difference from family average	.01		
Male	-.33*		
Group cohesion	.17*	.17*	
Expectations	-.28		-.32
Average positivity	.16	.14	.34**

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Table 41. Hypothesis 2E: Support Remains a Mediator for the Relationship Between Sibling Group Cohesion and Breadth of Perceived Personal Achievement when Controlling for Sacrifice and Expectations.

Variable	Coefficient (significance)	Without Predictors	Without Group Cohesion
Intercept	.80		
Family completeness	.37		
All full siblings	.32		
White	-.18		
Number of siblings	.18**		
Age (centered at 29)	.00		
Age difference from family average	-.00		
Male	-.29*		
Group cohesion	.11	.17*	
Sacrifice	-.09		-.09
Example	.29		.33
Competition	.72+		.74+
Role model	1.26***		1.27***
Introduced to activities	1.30***		1.32***
Active support	.89**		.92**
Academic	.41		.44
Expectations	.19		.19
Emotional support	.55**		.56**
Mean positivity	.08	.14	.17

Significance level ***<=.001, **<=.01, *<=.05, +<.1

Figures

Figure 1. Models Depicting Research Question Two

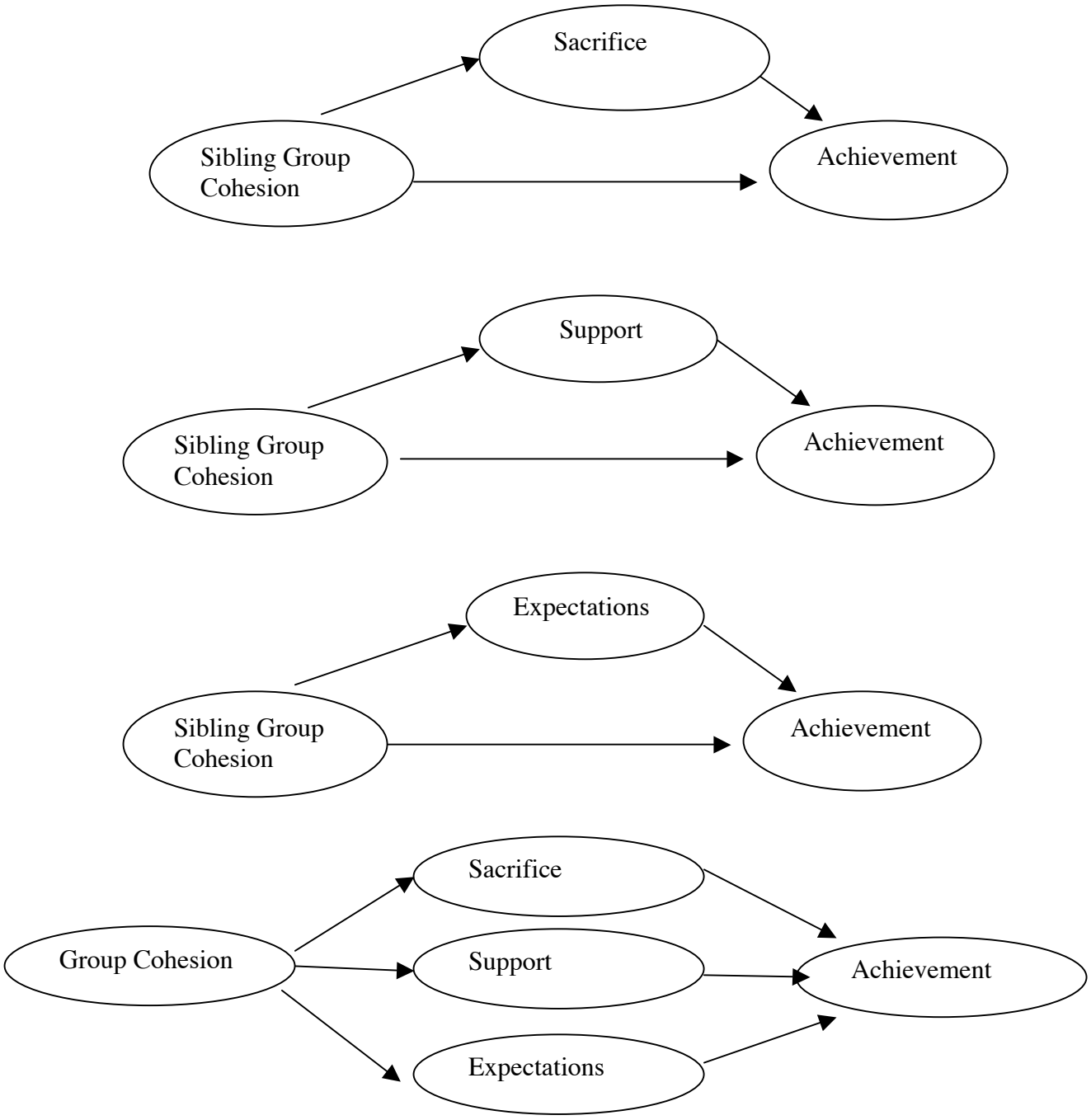
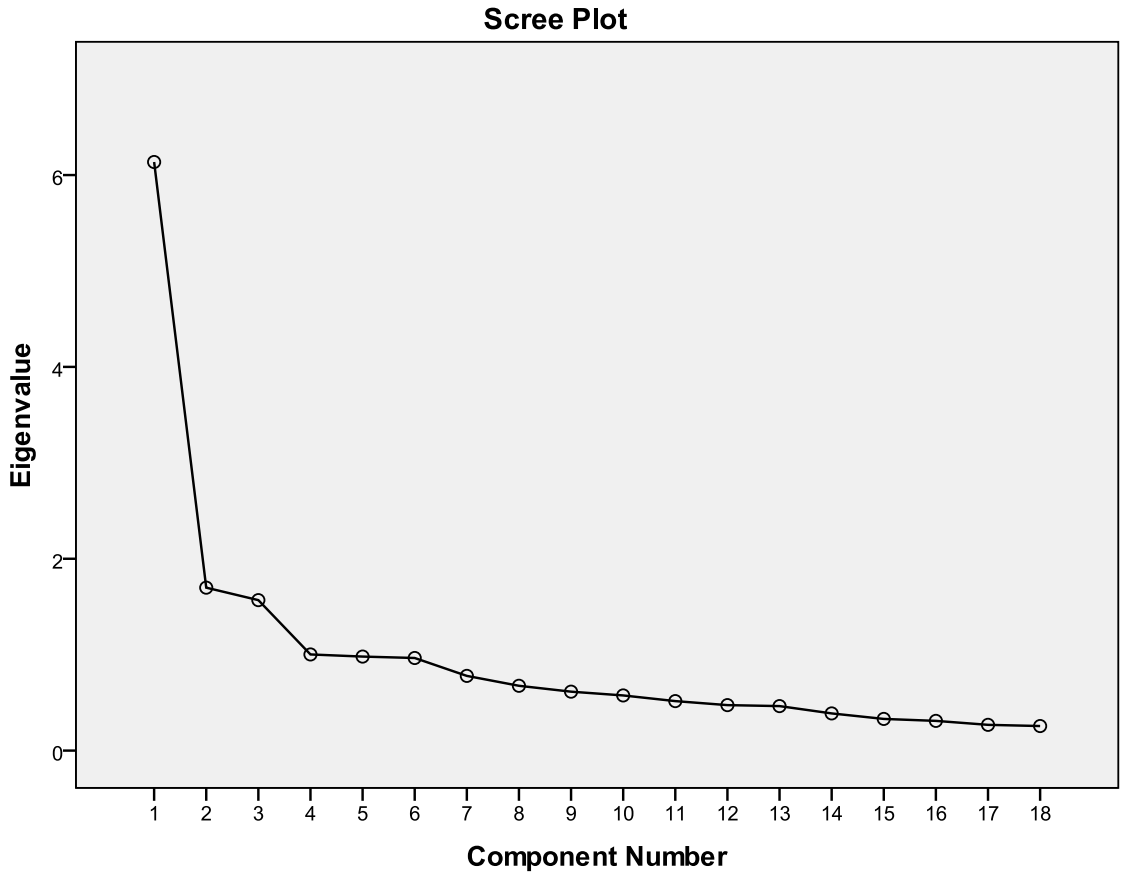


Figure 2. Scree Plot for Positivity Scale



Appendix A: Coding Scheme for the Support Scale

QUESTION 10 "HOW DID SIBS ENCOURAGE YOU"

Example= example, I look up to, role model, mentor, impresses me, or a general compliment ex. "she is so smart" or "she's kind, sweet, funny"

Competition= competition, even if not mentioned by the word ex. "I wanted to be better than"

Role model= Looked up to me, respects me, asks me for advice, I wanted to be a good role model for, is proud of me, brags to friends, impressed by me

Introduced to activities= introduced me to activities/interests. Shares the same activities/interests. Goes to the same school, etc.

Emotional support=Emotional support, talks to, listens to me, taught me tolerance, kindness, patience, etc. (other generally positive qualities). Helps me try new things. Is "supportive". Most vague mention of support, supportive of activities, interests, dreams

Active support= Actively supporting an interest. Attending games, concerts, etc. Buying artwork, giving books, articles (Not giving advice, must be an action)

Academic support= academic aid of any sort. aka, teaching to read, helping fill out college applications

Expectations= "be the best" "never give up" "I can do anything", taught to believe in myself, to be confident. Encouraged me to surpass others, to do my best, challenged me, pushed me, encouraged me to work hard, reminds me I'm smart/talented, etc.

Appendix B: Survey Questions Used for the Dyadic Positivity Scale

(some questions were not used in the final scale, as detailed in the methods section)

Choose how much you agree with each of these statements about influence for each of your siblings: (1= Strongly disagree, 5= strongly agree)

	Sibling 1	Sibling 2	Sibling 3	Sibling 4	Sibling 5	Sibling 6
This sibling set an example for my behavior						
From watching this sibling, I have learned how to do things						
This sibling gave me advice on how to behave						
This sibling encouraged me in my activities						
This sibling included me in activities and with their friends						
I gave this sibling advice on how to behave						
I encouraged this sibling to participate in his/her activities						

Choose how much you agree with each of these statements about compassion for each of your siblings: (1= Strongly disagree, 5= strongly agree)

	Sibling 1	Sibling 2	Sibling 3	Sibling 4	Sibling 5	Sibling 6
I would do this siblings' school work if needed.						
If necessary, I would lie to my parents to protect this sibling						
This sibling easily accepts help from me						
I can easily accept help from this sibling						
If necessary, I am willing to sacrifice my goals in order to let this sibling achieve his/her goals						
I feel fully accepted by this sibling no matter what I do						
I feel fully understood by this sibling						
I feel this siblings' success is my success						
I feel this siblings' failure is my failure						
I know this sibling would be there if I needed him/her to be						

Choose how much you agree with each of these statements about closeness for each of your siblings:

	Sibling 1	Sibling 2	Sibling 3	Sibling 4	Sibling 5	Sibling 6
How often do you see, e-mail, or talk on the phone with this sibling?	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day	1 -never or very rarely 2- a few times a month 3- about once a week 4- several times a week 5-almost every day
Would you talk to this sibling about a problem you were having?	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely	1- definitely not 2- probably not 3- unsure 4- probably 5- definitely
How much do you trust this sibling to keep one of your secrets from your parents?	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely
How much do you trust this sibling to keep a secret from your other siblings?	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely	1-not at all 2- 3- a little 4- 5- absolutely

If you lived (or do live) near this sibling, how often would you do things socially with this sibling (outside of holidays, official family gatherings etc.)?	1-never 2- rarely 3- sometimes 4- often 5- all the time	1-never 2- rarely 3- sometimes 4- often 5- all the time	1-never 2- rarely 3- sometimes 4- often 5- all the time	1-never 2- rarely 3- sometimes 4- often 5- all the time	1-never 2- rarely 3- sometimes 4- often 5- all the time	1-never 2- rarely 3- sometimes 4- often 5- all the time
How much do you enjoy hearing about the goals and activities of this sibling?	1-not at all 2- 3- moderately 4- 5- a lot	1-not at all 2- 3- moderately 4- 5- a lot	1-not at all 2- 3- moderately 4- 5- a lot	1-not at all 2- 3- moderately 4- 5- a lot	1-not at all 2- 3- moderately 4- 5- a lot	1-not at all 2- 3- moderately 4- 5- a lot
How much does this sibling know about you?	1-very little 2- 3- a bit 4- 5- just about everything	1-very little 2- 3- a bit 4- 5- just about everything	1-very little 2- 3- a bit 4- 5- just about everything	1-very little 2- 3- a bit 4- 5- just about everything	1-very little 2- 3- a bit 4- 5- just about everything	1-very little 2- 3- a bit 4- 5- just about everything

Appendix C: Coding Scheme for Achievement Variables

1. Academic
    a. Degree
        5=PhD/MD/JD
        4= working on PhD/MD/ JD
        3= Masters – MA, MS, MBA
        2=BA/BS
        1= High School

    b. Grades/Rank High School
        5= 4.0/Suma Cum Laude/ valedictorian/ #1 in class
        4= 3.9 up/ magna cum laude/ salutatorian/ top 2%
        3= 3.8 up/ 3%/ High honors
        2= 3.5 up/ Cum Laude/ 5%/ Honors
        1= 3.0 up/ 10%

    c. Grades/Rank College
        5= 4.0/Suma Cum Laude/ #1 in class
        4= 3.9 up/ magna cum laude/ top 2%
        3= 3.8 up/ 3%/ High Honors/ High Deans list
        2= 3.5 up/ Cum Laude/ 5% / Honors/ Deans List
        1= 3.0 up/ 10%

    d. Test Scores SAT or GRE /ACT or MCAT, LSAT, GMAT
        5= 1600/ 36 or top 97%
        4= 1500/ 33 or top 95%
        3= 1400/ 31 or top 93%
        2= 1300/ 29 or top 90%
        1= 1200/ 27

    e. Academic Award
        5= received more than one in grad school
        4= received one in grad school
        (ex. Scholarship to grad school, funding for research, grants, etc.)
        3= received more than one in undergrad
        2= received one in undergrad
        (ex. Scholarship to college, honor society)
        1= received any in high school

f. Academic Other

5= Peer reviewed Journal publication
3= Poster/Conference or presenting at conferences
1= multiple majors in college

g. Graduated Early

5= early from graduate school
3= early from college
1= early from high school

2. Athletics

a. Athletic Achievement High School

5= State champion
4= State participant/ all state
3= conference/ all league
2= Letter winner
1= involvement

b. Athletic Achievement College

5= National winner or All American, or Olympic Trials qualifier
4= NCAA participant
3= All Region
2= Region participant
1= involvement

c. Athletic- Multiple

5= 2 or more sports in college
4= 3 or more sports in high school
3= 2 sports in high school
2= community sport
(ex. Rock climbing, riding bikes, hiking, etc.) award
1= community sport hobby participant

d. Athletic Award

5= in College: social (leadership, team player, etc.)
4= in College: athletic (athletic scholarship)
3= in high school: social
2= in high school athletic
1= community

3. Leadership

a. Leadership High School (includes captain of a sports team)

5= leader of 5 or more groups
4= leader of 4 groups
3= leader of 3 groups
2= leader of 2 groups
1= leader of 1 group

b. Leadership College (includes TAing a class, being a RA, having a leadership role in a sorority or fraternity, etc.)

5= leader of 5 or more groups or two in graduate school
4= leader of 4 groups
3= leader of 3 groups or one in graduate school
2= leader of 2 groups
1= leader of 1 group

c. Involvement High School (national honor society goes here)

5= 5 or more groups
4= 4 groups
3= 3 groups
2= 2 groups
1= 1 group

d. Involvement College

5= 5 or more groups
4= 4 groups
3= 3 groups
2= 2 groups
1= 1 group

e. Other group involvement (such as community groups, boy scouts, neighborhood groups, military, etc.)

5= participant in prestigious international competition (Fullbright, Rhodes scholar, etc.) or award at international competition
4= award at a local or national competition (Eagle Scout)
3= leadership in an organization
3= participant in 2 or more community groups
1= participant in 1 community group

4. Professional

5= Received an award for success in profession
4= Promoted quickly
3= claims to have had success in profession, or award at work for not performance related
2= Has a good job, or got a good job early out of school
1= just happy to have a job, had a good internship, certifications

5. Artistic

5= national competition, or work with the top level
4= award, artistic related scholarship
3= leadership
2= success as an artist, selective group, or award in high school. (This is the highest number they should receive for high school related work.)
1= involvement

6. Volunteering

5= leadership
4= award
3= many years of participation
2= traveled to volunteer
1= involvement

7. Relationships

5= good relationships with siblings
4= good relationships with parents/ extended family
3= good husband or wife
2= good parent/ being a parent
1= good friend

8. Religious

5= leadership role (runs a youth group, leads a service, etc.)
3= active involvement (connected to church, attends lots of functions, has a job at church)
1= involvement – (just goes to church, or loves Jesus)

9. Popularity

5= Prom Queen/King. Homecoming Queen/King, Class president
4= Voted most___(something good)__
1= Have good friends

10. Travel/Languages
    5= Lived abroad repeatedly
    4= Lived abroad
    3= Traveled abroad
    2= Speaks 2 or more foreign languages
    1= Speaks 1 foreign language

11. Determined
    1= mentioned they are determined
    0= did not mention they are determined

12. Good looking
    1= mentioned they are good looking
    0= did not mention they are good looking

Appendix D: The Sibling Group Cohesion Scale (SGCS)

Our sibling group likes to spend time together as much as possible
Our ideas of excellence and personal goals are unified and connected
We have the same beliefs about politics, religion, etc.
We really enjoy each others' company when we are all together
There is rarely any fighting or arguing between us when we are all
I feel I am a member of a close knit group
I think of myself as part of a sibling group
I am enthusiastic about being a part of this sibling group
Our group of siblings is one of the best I know
My wellbeing is strongly affected by the wellbeing of my siblings
My sibling group is motivated to be great
Being a part of this sibling group motivates me to improve myself

Each question is answered on a 1 to 5 scale, with 1="strongly disagree", 3="agree," and 5="strongly agree."

Appendix E: Sibling Group Cohesion Scale Descriptive Statistics

Question	Mean	Standard Deviation	First Principle Component Score (rotated)	Second Principle Component Score (rotated)
Our sibling group likes to spend time together as much as possible	3.68	1.25	.70	.37
Our ideas of excellence and personal goals are unified and connected	3.7	1.14	.44	.69
We have the same beliefs about politics, religion, etc.	3.26	1.32	.10	.86
We really enjoy each others' company when we are all together	4.33	1.03	.76	.36
There is rarely any fighting or arguing between us when we are all together	3.39	1.33	.24	.55
I feel I am a member of a close knit group	4.23	1.14	.85	.22
I think of myself as part of a sibling group	4.47	1.01	.82	.15
I am enthusiastic about being a part of this sibling group	4.46	.97	.88	.21
Our group of siblings is one of the best I know	4.23	1.16	.80	.27
My wellbeing is strongly affected by the wellbeing of my siblings	4.04	1.08	.74	.31
My sibling group is motivated to be great	4.22	1.05	.75	.29
Being a part of this sibling group motivates me to improve myself	4.15	1.11	.76	.28

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